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CONTENTS

	PAGE
Editorials	145
Letters to the Editor	150
Publications Received	151
The Scrap Heap	152
Overseas Railway Affairs	153
New Argentine Coaching Stock	156
An Effective Fastening for Flat-Bottom Track	157
Mr. Cantlie on Minimising the Risk of Telescoping	158
A new Shock-Absorber	159
King's Cross Goods Station Remodelling, L.N.E.R.	161
Further Progress of the Trans-Iranian Railway	165
Pendulum Suspension for Railway Vehicles	168

ELECTRIC RAILWAY TRACTION

A Supplement illustrating and describing developments in Electric Railway Traction is presented with every copy of this week's issue

General Managers of Indian Railways

IN our news columns last week we announced that, in accordance with a recommendation of the Wedgwood Enquiry Committee, the chief executive officers of Indian railways are now designated General Managers if they are on State systems, and Agents and General Managers on company-worked lines. The former title is virtually a reversion to the term "Manager," which was in vogue on the few State-worked lines from very early days until shortly before the war. Then, however, as all the other important railways had as their chiefs, "Agents"—indicating agents or representatives in India of the British-domiciled companies—the three State systems were brought into line, and their Managers also became Agents for the sake of uniformity. To indicate their similar status, the Agents of companies' lines now add the term "General Manager," becoming Agents and General Managers. As at the present time the bulk of the main-line mileage is State-operated, it is reasonable that at any rate the Class I railways should have General Managers, but the reason for which we particularly welcome the change is that the designation "General Manager" is practically universal, as far as the Empire is concerned, and is understood the world over as meaning the chief executive officer. The term "Agent," on the other hand, is applied in America to the very numerous officers of district rank, and in other parts of the world to even lesser fry in their hundreds. Also, there can be little doubt that, outside India, the title "General Manager" conveys to all and sundry a much greater suggestion of dignity and importance than does "Agent."

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The Late Sir John Pringle

The death which we record elsewhere in this issue of Colonel Sir John W. Pringle, Chief Inspecting Officer of Railways from 1916-1929, removes one who was intimately concerned, as leading adviser of our public railway authority, with the developments that have so greatly affected railway signalling and safe working generally since the opening of the present century. At that time, when he first entered the Railway Department of the Board of Trade, there was no automatic signalling in this country, save on the Liverpool Overhead Railway, the design of which was of very limited application, and there was hardly any power working as it would be understood now. The three London tubes and the old steam Underground were worked by lock-and-block. But a great change was about to begin. Automatic signals were soon to appear on a main line, and later on the District and the new tubes; and within ten years there were many power signal boxes at work in Great Britain. Sir John inquired into certain accidents which considerably influenced the course of events, notably the Hawes Junction collision of December, 1910, which gave a great impetus to the extension of track circuiting and led the old Midland Company to extend the use of its interlocking block apparatus. He made his annual accident reports helpful by including more than mere statistical information, while the well-weighed judgments in his separate reports will always make valuable reading to those concerned with the safety of railways.

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The Week's Traffics

The long succession of decreases in the receipts of the four main line companies was continued last week when there was a fall of £217,000 in comparison with the corresponding period of 1937. In the previous week the united decrease was £187,000. Merchandise takings for the past week were down £148,000, coal receipts dropped £50,000, and passenger train earnings were lower by £19,000. In the corresponding week of 1937 passenger train traffics showed an increase of £99,000, merchandise a net increase of £29,000, and coal a net increase of £22,000. The coal increases in that week in 1937 were shown only by the two chief coal-exporting companies.

	28th Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	
	£	£	£	£	£	%
L.M.S.R. ..	− 12,000	− 69,000	− 1,000	− 82,000	− 924,000	− 2·67
L.N.E.R. ..	− 9,000	− 52,000	− 36,000	− 97,000	− 811,000	− 3·19
G.W.R. ..	—	− 21,000	− 16,000	− 37,000	− 391,000	− 2·72
S.R. ..	+ 2,000	− 6,000	+ 3,000	− 1,000	− 119,000	− 1·06

To date the united earnings of the four companies amount to £83,331,000, a decrease of £2,245,000 or 2·62 per cent.

* * * *

Northern Ireland Railways in 1937

Results for 1937 of railways wholly or partly in Northern Ireland were inferior to those of 1936, as shown by the Ministry of Commerce figures supplied to us. On the railways wholly in Northern Ireland—the Belfast & County Down, Bessbrook & Newry, Carrickfergus Harbour Junction, Clogher Valley, and Northern Counties (L.M.S.R.)—the net revenue available for appropriation was £20,455 in 1937, against £28,930 in 1936. Railway working for these companies together showed a loss of £17,156 in 1937, against one of £8,347 in 1936, but profits from the hotels departments of the Belfast & County Down and the Northern Counties reduced this loss to £6,951, and the total net income was £18,599, against £27,116.

Passenger train receipts improved from £361,004 to £367,299, but goods train receipts fell from £195,496 to £182,788. Railways partly in Northern Ireland include the County Donegal; Dundalk, Newry & Greenore; Great Northern; Londonderry & Lough Swilly; and Sligo, Leitrim & Northern Counties. They secured a total net income of £136,805 in 1937, compared with £146,494 in 1936. From railway working the total net receipts were £83,392 (against £78,777), and the profits of £98,272 on the Great Northern and of £5,519 on the County Donegal were partly offset by losses on the other lines. Passenger train receipts improved from £590,044 to £605,789, but goods train receipts fell from £569,303 to £558,094. Road transport profits in Eire were £3,111 on the Great Northern and £2,461 on the Lough Swilly, and the net receipts of the Great Northern hotels department were £4,382.

* * * *

The Vacuum Brake in India

Mr. Samuel Thomas Gresham, whose sudden death in Manchester is recorded on page 171, played a leading part in the equipment of Indian railways with the vacuum brake after that system had been adopted as standard in consequence of the Quetta trials of 1888. At those trials, conducted on the Quetta section of the North-Western Railway with the vacuum and Westinghouse brakes, Mr. Gresham represented the Vacuum Brake Company, although only 22 years of age. He subsequently joined the staff of the N.W.R. to supervise the installation and working of the vacuum brake on locomotives and rolling stock of that railway. Later, his activities were extended to embrace the instruction of staff on most of the Indian railways in the vacuum brake system. But it was not only with braking that Mr. Gresham was concerned in India, for the firm of Heatly & Gresham, of which he became Chairman and Managing Director, established offices at Bombay, Madras, and Lahore, and undertook the representation of some of the best-known manufacturers of railway equipment. Later, Mr. Gresham devoted himself to the conduct of the company's London office, where his popularity was evidenced by the many friends from overseas who called upon him when on leave in this country.

* * * *

Retirement of Mr. J. R. Morris—a G.W.R. Family

One of the best known divisional superintendents of the Great Western Railway will retire after over 50 years' service on July 31 next in the person of Mr. J. R. Morris, Divisional Superintendent at Chester. His retirement severs a connection with the Northern Division of that railway that has extended since 1861, when his father joined the company at Oswestry. Incidentally the family collectively has given no fewer than 650 years of service to the Great Western Railway. For example, his father, Mr. J. Morris, was Superintendent of the Line from 1904 to 1911. An uncle, Mr. S. Morris, was for many years Divisional Superintendent at Exeter. A brother, Mr. S. F. A. Morris, recently retired from the position of Divisional Superintendent at Gloucester; and another brother, Mr. W. R. S. Morris, occupies a responsible position on the staff of the Chief Accountant. Mr. J. R. Morris's career is recorded in our personal columns this week. The fact that the ever-popular G.W.R. "Holiday Haunts" guide has to this day been retained in its original make-up is a tribute to him, as having been largely responsible for the publication of its first edition. His foresight enabled him to visualise the effect the internal-combustion engine would have on railways, and his knowledge of the subject led to his selection, and temporary removal from Chester, to assist the management in connection with the railway companies' Road Traffic Acts of 1928. Apart from his work, he has always been greatly interested in staff welfare, ambulance, and athletic matters, as his biography shows. Mr. Morris retires in excellent health with the goodwill of his colleagues in the railway service and the staff under his supervision, and it is hoped by all who know him that he will have a long and happy retirement, a hope in which we share.

* * * *

Anything for a Sensation

The sensational headline, "German Railways Facing Collapse," which appeared in a London daily paper last week need not be taken any more seriously than other loud noises of the same kind aimed at entertaining the average reader. This particular matter was featured in the press earlier in the year and we duly dealt with it in an editorial note in our issue of February 11 (page 247). There is little more to be said now except to draw attention to some utterly nonsensical statements made in the paper referred to. In a leader, the report that 961 breakdowns and accidents occurred on the German railways in one year is characterised as "a shocking story"; but such figures without the details to which they relate have little significance. For example, in this country there were 5,513 accidents of all kinds in 1937, or 12·09 per million train-miles run—quite a good figure, yet one that might seem extraordinarily bad to those who do not know what trifling mishaps are included for purposes of record. It is quite likely that with the ambitious production programme now being attempted in Germany the railways are suffering, in much the same way as our own railways suffered during the slump in the years immediately after 1931; the curtailment of renewals necessarily adds to the work and worry of maintenance, but that does not mean that it is neglected to the danger point. In regard to passengers killed in train accidents the German railways still have an enviable record.

* * * *

The Telescoping Controversy

So many ill-considered opinions have found their way into print of late on the subject of railway safety that it is refreshing to find a newspaper of the high standing of *The Daily Telegraph and Morning Post* publishing an article from an experienced engineer on the subject. It is for this reason that we reproduce on pages 158 and 159 the opinions of Mr. Kenneth Cantlie as set forth in that journal on the subject of "Minimising the Risk of Telescoping." It should be understood that we do not necessarily share all Mr. Cantlie's views, but they are so well expressed and the subject engages so much attention these days that no apology is needed for placing them before our readers. Besides discussing the whole subject of collisions and their effects, Mr. Cantlie puts forward some interesting suggestions, based on his experience in China, for the economical strengthening of existing rolling stock.

* * * *

Argentine Railway Nationalisation Rumours

The recent report in a leading London paper of a proposal for the formation of an Argentine company, in which the Argentine Government would hold one-third of the shares, to take over the private railways, has caused comment and speculation in Buenos Aires railway circles. In view of the huge sum required for the purpose—estimated at £250,000,000 sterling—well-informed opinion seems to be that owing to the existing financial situation of the country and the economy campaign of the new Government, the difficulties in coming to a generally acceptable arrangement would be considerable. It must also be remembered that the Argentine investor has never

XUM

shown much interest in railway shares. There is, nevertheless, a strong and growing feeling among the staff in favour of the purchase of the foreign-owned railways by the State, and a Bill providing for the nationalisation of the private lines has just been presented to Congress by one of the newly-elected deputies. Under this Bill the Government would be authorised to arrange with any of the companies that might be in favour of nationalisation, the transfer of their property and assets to the State at a cost not to exceed 60 per cent. of the invested capital. The scheme would be financed by means of a bond issue for $650,000,000 gold ($1,477,300,000 paper).

* * * *

N.U.R. Silver Jubilee Conference

The annual general meeting of the N.U.R. concluded at Southport last week-end by re-electing the President, Mr. Walter Griffith, for a third year in office. This year the union celebrates its silver jubilee, and in his presidential address at the opening of the meeting, Mr. Griffith referred to "great strides made since the union was formed in 1913." He declared that the policy of the union was in the direction of one trade union for the railways and felt that the sooner the men could "speak with one voice" the better it would be. Parenthetically, it is observed that the A.S.L.E. & F. has since expressed the view that "absolute amalgamation has its limitations and dangers." During the fortnight's deliberations the N.U.R. conference considered a wide range of social, industrial, and political subjects. It held that the "unemployment problem" would be solved by adopting the principle of a working week of forty hours, and giving adequate pensions on retirement at age 60. The conference endorsed the programme of claims recently submitted to the railway companies for improved wages and working conditions, and approval was given to a proposal to co-ordinate the country's transport, Mr. Marchbank, General Secretary, urging that the "State could not afford to continue the prevailing chaotic and wasteful competition."

* * * *

Issuing Tickets Overnight

More than once the residents on the St. Helier estate at Morden in Surrey have put forward a request to the London Passenger Transport Board that tickets might be issued overnight to workmen so as to avoid lengthy queues at the Northern Line tube booking office in the early morning. In connection with the refusal of the most recent request, Mr. E. Rawdon Smith, Public Relations Officer of London Transport, has pointed out that, while such an arrangement would certainly have the effect of reducing the length of the queue and the time spent in booking in the morning, it would lead to an even greater concentration of passengers for the last workmen's trains than is already experienced. We believe that Morden station has for long presented a problem in view of the fact that many of the residents in that neighbourhood do not need to reach town by 8 o'clock, but wish to secure the advantage of the special cheap workmen's tickets, and yet arrive in town as near 9 o'clock as possible. They therefore endeavour to travel by the last workmen's trains in large numbers, and, to avoid disputes about the issue of workmen's tickets to the long queue which regularly assembles, it has been the practice of London Transport to arrange for two porters to take their places in the queue at the moment when the issue of workmen's tickets should cease. Those intending passengers in front of the porters are thereafter issued workmen's tickets whatever the hour and so are not penalised by reason of unavoidable delays in booking consequent upon the length of the queue.

The Handling of Goods

The King's Cross goods station of the L.N.E.R. has just been remodelled to increase its capacity and speed of operations, and the work is described on pages 160-164. It is interesting to observe the methods adopted to these ends, particularly as they appear to be so different from those favoured by the L.M.S.R. It may be recalled that in our issues of February 5 and March 5, 1937, we published a comprehensive description of the new methods now being practised on the L.M.S.R., the essentials of which are the reduction to a minimum of barrowing, and its replacement, so far as possible, by direct loading and unloading between railwagon and road lorry. In large depôts the existing fixed decks have been virtually dispensed with and replaced by portable decks, thus taking the load direct from rail to road vehicle and so eliminating barrowing and the delays almost inseparable therefrom. It will be seen from our article on the King's Cross goods station, however, that mechanical appliances are used to the utmost extent and it would certainly be instructive if the costs of handling at such a modernised depôt as this could be compared over a considerable period with similar costs at, say, the modernised goods depôt of the L.M.S.R. at Ancoats, Manchester.

* * * *

An American Main Line Diversion

It is not often that the main line of a great railway has to be diverted through 30 miles of rough and almost entirely new country. Nor is the heavy work thus entailed —involving five miles of tunnelling and over two miles of bridging in aggregate—any the less interesting because it is necessitated by the submergence of 27 miles of the existing line as a result of the building of a great dam 560 ft. in height. This diversion is on the Southern Pacific RR. and is described on page 154. Another unusual feature in connection with this dam project is that a temporary single-line tunnel, 1,821 ft. long and lined with ferro-concrete, is to be bored through solid rock 60 ft. below the foundations of the dam. This tunnel, which is already in hand, will serve a double purpose. It will enable the railway traffic to be carried on while the dam is building and until such time as the 30-mile diversion is ready for use, thus expediting the completion of the dam by perhaps two years. Also, once the diversion is open, the tunnel will be used as a by-pass for the flow of the Sacramento river under the dam until the latter is finished, when it will be finally plugged with concrete.

* * * *

Plaques and Snacks

Man's inventive genius, in order to keep pace with the march of time, is called upon to harmonise much apparent dissonance, but the ability to excite the gustatory senses while preserving artistic realism is, we submit, no mean accomplishment. In this the Southern Railway authorities have succeeded admirably, for the particular feature of mural *décor* incorporated in their new buffet cars must, by its ingenious association of animal and vegetable with a mineral co-efficient, appeal eloquently and in equal proportions to disciples of Lucullus and Pheidias. No gourmet could possibly cavil at the tastefully arranged brass plaques (which we illustrate on page 164) portraying entities and ingredients not yet metamorphosed into table delicacies, whereas the sight of metallic mixed grills, fricassees, omelettes, and salads would assuredly atrophy the appetite they purported to stimulate. Similarly the votary of sculpture, gladdened both by the absence of neo-Epstein influences and by the presence of a suave classicism of style in a modern setting, could not but exclaim, with a certain appropriateness: "For this relief much thanks!"

XUM

"Express" in the U.S.A.

A DISTINCTIVE feature of American transport from very early years has been the position occupied by the express companies, catering for what may be termed approximately the parcels traffic, which until comparatively recently was not handled either by the railway companies or by the United States Post Office. Changes within recent years have somewhat altered the position, but "express" is still—and likely to remain—a very extensive and important feature of the business life of the country. The originator of this characteristically American type of shipping is commonly accepted to be Mr. William F. Harnden of Boston—known as the "carpetbag expressman"—who established an express company on March 4, 1839, to meet a public need of the time for through transport facilities between New York and Boston. He made the trip himself regularly, using train, steamboat, and stage-coach, to complete the journey, and the volume of packages entrusted to him soon outgrew his carpetbag. He then organised a New York to Philadelphia service, and by 1850 his business had been extended into the Southern States. An impressive monument to Harnden's memory stands in Mount Auburn cemetery, near Cambridge, Massachusetts, and is often called "a shrine to expressmen." Henry Wells and Alvin Adams, both employees of Harnden, established enterprises of their own which extended the service westward and contributed greatly to the development of the West during the pioneer era of the stage-coach and the pony express. Adams began in 1840 in competition with Harnden, but in 1854 Adams & Co., Harnden & Co., and two smaller firms (Thompson & Co. and Kinsley & Co.) were consolidated to become the famous Adams Express Company. The Livingston Company (formed in 1841) and the Wells Company (founded in 1845) were merged in 1850 as the even better-known American Express Company.

After the civil war, this type of business spread extensively and resulted in the formation of numerous large express companies, but most of these became consolidated into six undertakings—the United States (formed in 1854), the Adams, the American, the Pacific (formed in 1879), the Southern (incorporated in 1886), and Wells, Fargo & Company (established in 1852). Broadly, these six divided the field among themselves, every company having most of the traffic in its particular section. Moreover, in so far as different companies were interested in the same section, and to the extent that they came into traffic competition, their relationships were regulated by mutual understanding so that there was no violent, and little active, competition among express companies. Every large railroad granted a monopoly of its parcels traffic to a single express company under the terms of an agreement which stipulated that the express company should handle, load, and unload the parcels; assume the risk for loss and damage; and pay the railroad a percentage (usually 40 per cent.) of the gross receipts for providing and hauling the carriages used. An important stipulation was that the minimum express rates should be fixed at a percentage above the charges the consignor would have to pay were the goods dispatched as freight. Apart from the fact that the railways themselves did not engage in this type of business, the importance of the express companies was further enhanced by the limit of 4 lb. on the weight of any postal packet which applied until the beginning of 1913. More recently, however, the scope of the U.S. Post Office has been steadily increased, until at the present time packets up to 22 lb. in weight are accepted.

During the European war period the domestic express business was consolidated into the American Railway Express Company, but without any fundamental change in the conduct of affairs. The position applied until February 28, 1929, when control of the undertaking was acquired jointly by all the large American railway companies, and under the new auspices the name Railway Express Agency Inc. was adopted on March 1, 1929. In addition to the inroads into the express business necessarily resulting from the increased Post Office activity, American railway freight transport has, of course, undergone a considerable change with the extension of road transport. Railway collection and delivery services are now an accepted feature, whereas only a few years ago they were virtually non-existent. Nevertheless, the express business still maintains its distinctive features in the handling throughout of parcels and other small consignments. It may be added that other businesses which grew up around the extensive organisations of the old express companies, such as those of bankers and tourist agents, have been unaffected by these changes. The American Express Company, for example, still flourishes as a world-wide undertaking, and the present company, which was incorporated in New York on November 25, 1868, has included since 1925 the undertaking of Wells, Fargo & Co., whose pioneer activities in the West were recently given publicity in a popular film.

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Bombay, Baroda and Central India Railway Company

A SLIGHT increase in gross earnings was more than offset by a rise in expenditure in the year ended March 31, 1938, and net earnings were lower than those for the previous year. The combined system, apart from the 522¾ miles worked for Indian States and other companies, now consists of 1,035¼ miles broad gauge, 1,879 miles metre gauge, and 72¼ miles 2-ft. 6-in. gauge worked by the company for the Government of India. Except for a decrease of 2¼ miles on the metre gauge there has been no change in the mileage operated by the company. Gross earnings of the combined system for the year under review increased by Rs. 5,42,565 to Rs. 11,97,10,108, but in the expenditure of Rs. 6,56,14,152 there was an advance of Rs. 30,49,997, so that the net earnings of Rs. 5,40,95,956 were lower by Rs. 25,07,432. The company's share of surplus profits, after deducting Indian income tax and super tax, is Rs. 8,77,433, compared with Rs. 9,61,224 for the previous year, and has produced £65,533 in sterling. Stockholders receive 6 per cent. (including 3 per cent. guaranteed interest) for the year under review, the same as for the last seventeen years. Some operating results for the combined system are compared in the accompanying table:—

	1937-38	1936-37
Passengers, number	57,762,032	54,437,216
Passenger receipts, Rs.	3,77,55,723	3,56,72,058
Tons carried	9,551,887	9,094,740
Average ton-mile receipt, pies ..	7·67	8·19
Goods receipts, Rs.	7,28,73,801	7,44,56,619
Gross train-mile earnings, Rs. ..	6·89	7·41
Net train-mile earnings, Rs. ..	3·11	3·52
Train-miles	17,370,488	16,076,874
Operating ratio, per cent.	54·81	52·51

Coaching receipts on the combined system showed an increase of Rs. 21,29,079 to which all five classes of passengers contributed on both the broad and metre gauge lines. In goods traffic as a whole there was an increase of 457,147 tons, but a decrease of Rs. 15,82,818 in receipts. General merchandise was down in quantity by 171,643 tons and in receipts by Rs. 25,20,602. The principal decrease was in raw cotton, of which the quantity carried was 117,970 tons less, with receipts Rs. 38,24,198 lower. Wheat, however, was up 30,907 tons and Rs. 9,23,077.

and in coal, coke, and oil fuel there was an increase of 176,807 tons and Rs. 6,56,229. Maintenance of structural works cost Rs. 10,30,247 more than in 1936-37. The increase of Rs. 9,31,092 on the broad gauge was chiefly under replacements and renewals due to larger outlay on renewals of track. In maintenance and supply of locomotive power the increase of Rs. 5,68,031 on the broad gauge was due to increased expenditure under running staff owing to increased mileage, and to higher fuel costs; on the metre gauge the increase of Rs. 5,29,891 was due chiefly to heavier expenditure on locomotive repairs because of increased mileage. Maintenance of carriage and wagon stock cost Rs. 4,40,509 less on the broad gauge, chiefly because of fewer replacements and renewals, whereas on the metre gauge the expenditure on replacements and renewals was higher by Rs. 6,06,885. Capital expenditure charged off during the year under review amounted to Rs. 10,24,587, mainly on structural works. There was an expenditure of Rs. 2,21,311 on carriages and wagons, and a credit of Rs. 2,22,719 in respect of locomotives.

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Belgian Light Railways

FOR the Société Nationale des Chemins de fer Vicinaux, which since 1885 has provided efficient and economical transport in Belgium by means of light railways frequently laid upon or alongside public roads, the results in 1937 were rather less favourable than in 1936, from causes beyond the control of the management. In consequence of the policy steadily pursued for some years past of modernising the system the receipts in 1937 improved by fr. 25,827,407 or 10·47 per cent., but expenses advanced by fr. 27,616,796 or 11·49 per cent. because of the higher price of materials and the increase in salaries and wages. Steam services are being replaced by railcars on lines where passenger traffic is light. There are now 255 railcars in service as against 250 at the end of the previous year. Up to the end of 1937 sixty petrol railcars had had their motors replaced by diesels. At that date there were 170 diesel railcars in service and 24 were in course of construction which are expected to be at work in the course of 1938. Electrification has also been steadily extended, and in 1937 1,421 km. were electrically operated, compared with 1,360 km. in the previous year. Lines operated by steam or by railcars were 3,376 km. in 1937, against 3,438 km. in 1936. Out of the 166 lines operated the number worked at a loss in 1937 was 62 compared with 61 in 1936 and the loss involved was fr. 6,815,363 against fr. 4,851,530. A profit totalling fr. 16,249,943 was shown by 104 lines, and the average dividend paid was 1·4929 per cent., compared with 1·5640 per cent. in the previous year. The accompanying table gives some operating figures for the whole system:—

	1937	1936
Total passengers	187,973,898	173,003,378
Goods traffic, tons	4,082,583	3,862,391
Kilometres operated	4,797	4,798
Train-kilometres	65,767,259	62,582,213
Operating ratio, per cent.	98·35	97·45
	Fr. (Belg.)	Fr. (Belg.)
Passenger receipts	224,691,835	201,363,388
Merchandise receipts	43,176,509	42,014,606
Gross receipts	272,390,717	246,563,310
Expenditure	267,883,660	240,266,864
Net receipts	4,507,057	6,296,446

On the steam or railcar operated lines and on the bus routes replacing steam services the receipts in 1937 were higher by fr. 4,776,000 or 5·85 per cent. than in 1936. Goods receipts showed an advance of fr. 1,161,903. Railcar passengers increased from 17,724,476 to 20,008,832, but the number of steam train passengers fell from 4,338,297 to 3,140,228. Bus passengers in 1937 were 4,788,327, against 3,112,796 in 1936. Expenses on the steam and railcar operated lines increased by fr. 6,400,000 or 7·42 per cent., and the operating ratio advanced from 105·34 per cent. to 106·91 per cent. Passengers on the electric lines numbered 159,506,261 in 1937, against 147,420,601 in 1936, and the receipts on these lines, which represented 68·28 per cent. of the total earnings of the system, improved by fr. 21,051,484 or 12·76 per cent. Expenses advanced by fr. 21,233,964 or 13·76 per cent., and the operating ratio showed, accordingly, the slight rise from 93·54 per cent. in 1936 to 94·37 per cent. in 1937.

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London Tube Collision

COLONEL TRENCH'S report on the collision on the Northern tube line of the London Passenger Transport Board on March 10 will be found summarised on page 178. Responsibility is placed primarily on a power signal lineman who, over anxious to avoid delay, had left a faulty top contact on a track relay bridged for a short time, cutting out all but 100 ft. of the track circuit sections controlling the second starting signal at Waterloo, provided to deal with the nine-car trains. Presumably he imagined he was cutting out only the overlap beyond the next stop signal, hence his reason for showing a red hand signal for a short precautionary interval after the green indication appeared. His intention was to wire a spare good contact in parallel with the faulty one, which would have been satisfactory, but, being interrupted by conversation, he did not complete the work until it was too late. He appears to have conveyed the idea to the stationmaster that things were practically right again, so that the necessity for trains to run with extreme caution as far as Charing Cross was not impressed on the drivers concerned. Unfortunately some confusion was created by an unfounded report that signals between the two stations were flickering their aspects, and the actual fault was not handled as it might have been. The report recommends that the staff be reminded of the necessity for rigidly observing the regulations covering procedure when signals are defective, and holds that one of the traffic staff present should have realised the position sufficiently to take charge. It was not within the lineman's province to control the running of trains while the defect existed, certainly not in any way to reduce the control over the green light aspect. The driver of the colliding train could not have avoided the accident and the guard of the standing train behaved with commendable promptitude and presence of mind.

Much public criticism was aroused by the long delay that occurred in detraining passengers from two trains standing at the Lambeth power rail gap, in the long section between Kennington and Waterloo. People have not unreasonably inferred from various posters and publications carrying the authority of the L.P.T.B. that drivers and guards could communicate by telephone with the traffic controlling staff at any time. To learn that a long period elapsed, with passengers crowded in heat and much discomfort, some even fainting, without such means of communication being used, came as a surprise. It appears that the L.P.T.B. regards the tunnel wires as being primarily for cutting of traction current in case of fire, or fusing leading to smoke, and considers it unadvisable to permit their use for any other purpose, fearing it might tend to militate against the absolute reliability of the wires in the circumstances for which they are installed. The trainmen were therefore correct in acting as they did and not using them.

We agree with Colonel Trench that the matter of the

use of the tunnel wires deserves reconsideration, after what happened in this case. That the trains should have been overlooked for a time through a telephone misunderstanding between a traffic controller and a signalman is comprehensible, but if passengers are experiencing growing discomfort from heat and crowding we think they have a right to expect a message to be sent from their train with all possible expedition, the more so because they have, if unintentionally, been led to believe that the ability to establish unrestricted and instant communication at any time existed and was one of the great safety features of the London tube lines. It is very satisfactory to read that the trainmen themselves praised the calm and reasonable behaviour of passengers in what must have been, for some at least, a trying experience; for, as Colonel Trench observes, the absence of anything approaching panic is of vital assistance to the staff in carrying out the necessary arrangements for the safety of all. Application to Parliament has proved necessary to carry out the works required to improve the ventilation of this long tube section—an improvement which has been recognised for some time as desirable.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Tramroad and Tramway

London, W.6
July 11

To the Editor of The Railway Gazette

Sir,—I was interested to see in Mr. John Wellington Wells's letter, published in your issue of June 24, reference to the early practice of laying along streets parallel lines of stone blocks for the wheels of ordinary carts. It is

possible that one of these stone tramways survives in New Street (off St. Martin's Lane, London), quite near to the Maiden Lane, Covent Garden, mentioned by your correspondent—and, incidentally, within a few yards of the works in which The Railway Gazette is printed. I enclose a recent photograph of this street which clearly shows its form of construction.

Yours faithfully,
VITESSE

The Spanish Mining Situation

69, High Street, Marylebone, W.1,
July 15

To the Editor of The Railway Gazette

Sir,—I was interested to read, in your issue of July 8, the comments on the new Spanish Nationalist decree regarding concessions in the exploitation of mines. Far from this law being in favour of British interests, a number of well-informed people with whom I have discussed the subject believe exactly the contrary to be the case. There is now no secret about the fact that Spanish industry, and particularly the Basque iron ore activities, are under the direct or indirect control of German technicians.

Franco is obviously indebted to Germany for the very great help that country has given him, and it stands to reason that he would not, or, for that matter, dare not, introduce any new regulation which would protect British trading interests against those of Germany; and, generally speaking, British and German interests, in this direction at least, are opposed to one another. Consider, for example, the ruling that the chairman, two-thirds of the directors, and sixty per cent. of the capital must be Spanish. This provides the perfect opportunity for German nominees to control all such companies.

In writing this letter, I want to make it clear that I hold the British Government's view of neutrality as regards the contending factions in the Spanish war, but I do feel that we must pay close regard to Germany's activities there, if only for our own future security.

Yours faithfully,
V. R. H. AUSTIN

[The Basque iron ore has for many years been mined by private companies, some British and some German, and 461,984 tons were exported from Bilbao to the United Kingdom in the latter half year of 1937. As regards the control by nominees, surely this would apply to any nationality. We quite agree that close regard must be paid to the activities of other nations and we do not doubt that British enterprise will be equal to the task.—Ed., *R.G.*]

Better Road Signs Wanted

69, High Street, London, W.1.
July 19

To the Editor of The Railway Gazette

Sir,—You recently reported that L.M.S.R. stations are to have new name signs made of minute spheres of glass-like beads which are said to give the same effect in artificial light as in daylight and are free from dazzle.

If this is so, they might well be extended to roads. Anyone who drives a lot at night knows the present difficulties. When you are near enough a direction sign to read it, it has passed out of the beam of the car's lights and if it is of the kind that is studded with reflectors, the letters are often more dazzling than legible.

Yours faithfully,
A. R. HOWARD

Modernisation of King's Cross, L.N.E.R.—The L.N.E.R. announces that in pursuance of its scheme of modernisation at King's Cross station, an important contract has just been let for the construction of a new parcels and Post Office mail depot on a site adjacent to the main station in Upper Edmund Street. It is intended that the mail traffic shall be handled at this depot when it is complete, and an underground passage-way will connect with the platforms in the main station and by this means all mail and parcels traffic will be conveyed to and from the departure platforms underground, thereby removing any congestion of parcels and mail barrows from the platforms themselves. This is a further stage in the scheme for improving the station, part of which has already been carried out.

PUBLICATIONS RECEIVED

Rambles in the Wye Valley. By Hugh E. Page. London : Great Western Railway, Paddington Station, W.2. 7¼ in. × 5 in. 144 pp. and folding map. Illustrated. Price 6d. net.—This invitingly and enterprisingly written booklet describes in detail over 300 miles of rambles and walking tours in the lower Wye and Usk valleys, the Forest of Dean, and the Black Mountains—a fine district which will be a delight to the walker. Within this area, served by the railway lines between Gloucester and Hereford, Hereford and Pontypool Road, Pontypool Road and Ross, Monmouth and Chepstow, and Newnham and Cinderford, twenty interlinked rambles are set out, based on various stations *en route*, for which incidentally the No. 9 10s. 6d. Weekly Holiday Season Ticket will be found an excellent proposition, as it covers all the stations used and enables the traveller to take any walk desired and to adjust the distance required. A map for each walk and a general diagram for the whole area covered are included in the booklet.

Nationalisation of Transport : An Impartial Review. With a Foreword by Sir Josiah Stamp. London : The Modern Transport Publishing Co. Ltd., 105/109, Strand, W.C.2. 7 in. × 4¾ in. 75 pp. Paper covers. Price 1s. net.—As Sir Josiah (now Lord) Stamp says in his foreword to this reprint, it is by reason of the fact that transport is usually recognised as vital to the community that it is proclaimed in certain quarters to be an industry which should be nationalised. Certainly, the tendency in the post-war era has been towards merging commerce and industry into larger units, and the elimination or reduction of competition, and whatever benefits or disadvantages might be expected or might actually accrue from nationalisation of transport there is no doubt that the subject is a live one at the present time. Our contemporary, *Modern Transport*, therefore, published recently a series of articles surveying the question, and these have now been reprinted in brochure form with an index. The approach to the subject is entirely that of operating efficiency and deliberately omits considerations of political expediency and theory. The scope of the inquiry is set out in chapter 1, which also gives an historical outline of the rise of railway nationalisation proposals. Criticisms of the British railways are examined in chapter 2 ; the much-quoted but ill-defined phrase "freedom of choice" is considered in chapter 3 ; and the road and rail position summarised in chapter 4. Efficiency under present conditions is reviewed in the next two chapters, and then a section is devoted to a consideration of how State ownership of transport might be achieved and the basis of purchase. Chapters 8 and 9 outline probable advantages and repercussions of nationalisation and possible disadvantages. The conclusion reached by this inquiry is that the weight of evidence at the present time is against any step towards nationalisation, although this expression of opinion is qualified by the somewhat obvious remark that should conditions change in the future it may be necessary to revise this conclusion. It is also contended that voluntary steps for the rationalisation of important sections of the transport industry at present taking place can but have a beneficial effect on transport as a whole. This series of articles constitutes a careful survey of an important subject, and should be welcomed in brochure form as a handy little work of reference even to those who do not necessarily agree with the conclusions.

Seven Shifts. By various writers. Edited by Jack Common. London : Secker & Warburg, 22, Essex Street, W.C.2. 8¼ in. × 5½ in. × 1 in. 271 pp. Price 7s. 6d. net.—The purpose of this book is to give the reader an idea of what a working man actually does while at his job, what he thinks, and how he feels towards money and politics, his employer, his family, and "things in general." With some difficulty, the editor tells us, he has persuaded seven representatives of the "working class"—a steelworker, a plasterer, a railwayman, a blastfurnace worker, an unemployed man, a gas worker, and a stallholder—to express their opinions on paper. Though one can disagree with almost as much as one can agree with in this book, the result is a very stimulating and live work. It needs no deeply sympathetic and understanding nature to appreciate the desires, the frustrations, and, though there do not seem to be many of them, the compensations of life, herein so poignantly revealed. The seven contributors are for the most part men of sensitive and imaginative minds on whom the sordidness, futility, and misunderstanding in their lives has apparently stamped such a deep impression that the bitterness of their resultant emotions has left little room for appreciation of anything else.

French Tourist Literature.—Travel publications from France are now appearing with the imprint of the French National Railways, although reference to the different regions of the system by their former names still remains in the text. Thus, in illustrated guides to "Roman and Mediæval France," and to "Corsica, the Isle of Beauty," the reader is still referred to the rail and road services of the P.L.M. Both booklets present readable and often graphic descriptions of scenery, people, and customs. Two other booklets enumerate the various regular motorcoach excursions that can be made in connection with the railway services in the territories of the former State and Alsace-Lorraine systems. These show fares, itineraries (amplified by maps), and timetables in a convenient form that assists preliminary planning of a holiday. For the visitor to France who makes Paris his centre, the Société des Transport en Commun de la Région Parisienne offers an attractive programme of motorcoach tours in the city and its surroundings that are described in another booklet. Another interesting publication reaches us from the Federation des Syndicats d'Initiative de Savoie, in which the attractions of Savoy are shown entirely in pictures, with a thumb-index to the various types of holiday activity represented.

Braided Aerial Cables.—A folder from British Insulated Cables Limited, Prescot, Lancs, gives specifications of various types of weatherproof aerial cables with single hard-drawn copper conductors. Single, double, or treble weatherproof coverings are obtainable, impregnated with a black or red preservative compound as desired. If specially ordered, a chocolate, green, or grey finish can be supplied. An alternative form of covering consists of lappings of impregnated paper tapes laid direct on the conductor, and then single-cotton lapped and treated with a red compound.

Ventilating Problems.—The requirements of the new Factories Act of 1937 makes opportune the appearance of an illustrated folder from Keith Blackman Limited, 27, Farringdon Avenue, London, E.C.4, in which the rules governing the heating and ventilating of industrial premises are set out. Keith Blackman equipment for fulfilling these requirements, and for the removal of fumes and dust are illustrated, with short explanatory notes. Another folder deals with ventilation alone, and gives numerous illustrations of fans installed in workshops and factories, accompanied by notes on what constitutes efficient ventilation, and how it may be ensured. Three new illustrated catalogues from the same firm deal with air-circulating and ventilating fans for laundries, various types of drying plant, and paddle-wheel fans for removing dust of a clogging nature.

Jasper National Park.—A new Canadian tourist attraction—the Columbia Icefield—a great glacial cap covering 150 sq. miles and which crosses the Great Divide, is described in a booklet we have received from the Canadian National Railways. In the past, it is stated, only a handful of people have seen this icefield, but today a new road enables sightseers to view what is hailed as a wonder of the world, by a six-hour motor trip from Jasper Park Lodge, the Rocky Mountain resort in Alberta situated in Jasper National Park, the borders of which embrace 4,200 sq. miles of Rocky Mountain territory in which one mountain range succeeds another and where countless rivers thread its valleys. The Canadian National Railways booklet, copiously illustrated and showing the beauties of Jasper in colour, surveys all its attractive holiday features and gives details to assist intending tourists. Copies may be obtained from this railway's London address, 17-19, Cockspur Street, S.W.1.

XUM

THE SCRAP HEAP

Miss Lillian A. Dunwoodie has handled a total of more than two million telegrams over a period of 27 years. She has just retired as operator at the Canadian National Railways telegraph office at Edmonton, Alberta, after an enviable record of uninterrupted service.

* * *

Mr. Reginald Gamble, Assistant to the Industrial Agent, Chief General Manager's office, L.N.E.R., King's Cross, who is the B.B.C. beekeeping expert, continues his quarterly talks on Saturday, July 23, at 3 p.m., in the Regional programme, when he will discuss the question of "Honey for Show" with Mr. H. S. Barter, Salisbury, one of the most successful modern exhibitors.

* * *

Ten thousand "firecrackers" were issued by young ladies to passengers in the concourse of the Boston & Maine's North station, Boston, Mass., to advertise Fourth of July excursions. Each of the firecrackers, which were manufactured in the regular way except that no powder was inserted, was papered with a standard "flyer" of the railroad excursion type, printed on red paper. Rolled up on the cardboard core of the "firecracker," the "flyer" appeared to be the cover of a very convincing Fourth of July noisemaker. On the top of the firecrackers was imprinted "Open with care at home." It is reported that hundreds of season-ticket holders (commuters) found them material for practical jokes.

* * *

HE WOULDN'T WAKE THE BABY!

Although in 1908 the whistling previously common was largely abolished, later the abolition of watchmen at level crossings brought whistling back into place. I had by then become a driver and I shall never forget the dilemma I was faced with one fine day. Ought I to whistle or not? It was at a little school house alongside the line, where a schoolmaster's family still resides, and where the young wife, as I knew, was expecting a little one. Seeing tiny clothes hanging out I said, "No; I really must not whistle now or I shall wake the baby." I did not mind breaking the rule for, for years past, I had never seen a person on the crossing nearby. Every time I pass there I still think of the child, now a young man who always signs good-day to me in a friendly manner but little suspects the tremendous mental conflict that went on in my head when he was born. *—From "Recollections of a Driver" in the "Swiss Federal Railways Bulletin."*

* * *

The latest quarterly sales of unclaimed articles found in trains on the Belgian National Railways included 128 pairs of trousers, 6 waistcoats, 25 costumes, 15 frocks, and six skirts. Women left behind six wedding rings, 14 gold rings, and a quantity of gold bracelets, brooches, ear-rings, and other jewellery. The short-sighted forgot 170 pairs of spectacles, seven pince-nez, and a monocle; three people left alarm clocks in trains; and 166 passengers left shoes and slippers behind.

* * *

We reproduce a drawing by Mr. Piet de Jong, Architect and Illustrative Artist to the British and American Archæological Schools in Athens, who makes a hobby of designing and building ¾-in. scale locomotives. This design is for a mixed-traffic locomotive having cylinders of 1½-in. diam. by 2-in. stroke, which in full-size practice would be 20-in. by 32-in. stroke, and 4-in. diam. coupled wheels, equivalent to 5 ft. 4 in. full size. With a boiler pressure of 80 lb. per sq. in. drawbar pull works out at 36 lb., and if, by adopting extra heavy frames and bracing, the weight on the coupled wheels were brought up to 90 lb., the locomotive should be able to start a load of 750 lb., or if slipping were eliminated at least 900 lb. The valve gear is designed to give a cut-off of 75 per cent. of the stroke. Piston valves are ¾-in. diam. with liners, and have $\frac{5}{32}$-in. ports and $\frac{3}{32}$-in. lap. The boiler is 5-in. diam., the firebox 9-in. by 5-in. by 4½-in. high (average) with an 8-in. long by 3-in. diam. combustion chamber containing 22 water tubes $\frac{5}{16}$-in. diam. The boiler has 6 firetubes ⅝-in. diam. by 17 in. long and one of ⅞-in. diam. giving a total heating surface of well over 500 sq. in. The grate area is 45 sq. in. The only part of the model so far built is one of the bogies, with ball bearings and equalised springing, for which Mr. de Jong got a diploma at the Norwich Model Engineers' show last September.

* * *

WHAT'S IN A NAME?

A correspondent writes that the L.N.E.R. 4-6-2 *Mallard* put up a very fine performance on July 3. In L.N.W.R. days, he says, the 4-4-0 *Wild Duck* did a wonderful run with a very heavy train which was duly recorded at the time.

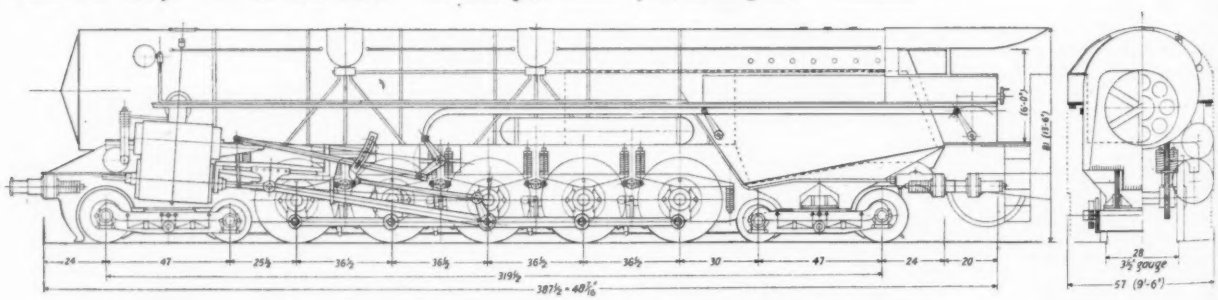
* * *

In Bishop Carpenter's reminiscences is a story of a clever draughtsman who bought every Saturday a week-end ticket from King's Cross to Hornsey. Before using it, he altered Hornsey to Holbeck. This required some skill; but it was done, and done so well that the fraud was not discovered for some time. Every week this man travelled to Leeds, alighting, as his ticket intimated, at Holbeck. No one noticed that the ticket had been tampered with, and even when the fraud was discovered it was not through any clumsiness of the craftsman culprit. It was discovered when a new route was opened for a short portion of the line, and tickets were issued with the additional words: "By West Yorkshire line," or some such indication of the new route. The new words were wanting on the adventurer's ticket, the lack of them led to inquiry, and inquiry to discovery and prosecution. The strangest part of the story is that the man went this weekly journey to Holbeck to preach at an evangelistic service in Leeds!

* * *

The much-travelled American was boasting of the railways of his country. "I tell you," he said, "In God's own country you can travel all day and all night, and maybe the next day too, and still be in the same State."

"Well," said the stolid Britisher, "we've got trains like that in this country, but we don't crow about it." *—From "The Best Railway Stories," published by the Richards Press Limited.*



Architect's design for a ¾-in. scale 4-10-4 locomotive to British standard loading gauge

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

NEW SOUTH WALES

The 150th Anniversary Celebrations

On January 26, 1788, the first white people settled in Australia, so the 150th anniversary of the founding of the colony of New South Wales was celebrated this year. The occasion was an important one to the nation generally and to the railways in particular. Actually, though railways were non-existent on the colony's birthday, and it was not until 82 years ago that the first line was constructed in New South Wales, the Railway Department made arrangements for the exhibition in Martin Place (the main thoroughfare of Sydney) of the locomotive which worked the first passenger train between Sydney and Parramatta. It is a 0-4-2 tender engine built by Robert Stephenson at Newcastle-on-Tyne in 1854. The driving wheels are of 5 ft. 6 in. diameter, the cylinders 16 in. × 24 in., and the weight in working order 26 tons. This locomotive was in service from 1855 to 1879 and ran 421,498 miles. On termination of the display period the locomotive was returned to the Technological Museum, which is under the control of the Department of Education.

As might be expected, the publicity given to the 150th anniversary celebrations attracted many passengers to the State. Rail passenger journeys increased from 14,618,684 in January, 1937, to 16,565,945 in January, 1938, equivalent to a 13 per cent. increase.

[The 0-4-2 locomotive is illustrated on page 170 ED. *R.G.*]

WESTERN AUSTRALIA

Accelerated Trans-Australian Service

The new and greatly accelerated through service between this and the Eastern States was inaugurated on June 4; it is run three times weekly in each direction to the following schedules:

Eastbound

Perth (dep.), 4.40 p.m., Tuesday, Thursday, and Saturday.
Kalgoorlie (dep.), 8.5 a.m., Wednesday, Friday, and Sunday.
Adelaide (arr.), 6.40 p.m., Thursday, Saturday, and Monday.
Melbourne (arr.), 9.35 a.m., Friday, Sunday, and Tuesday.
Sydney (arr.), 8.55 a.m., Saturday, Monday, and Wednesday.

Westbound

Sydney (dep.), 8.50 p.m., Tuesday, Thursday, and Saturday.
Melbourne (dep.), 7 p.m., Wednesday, Friday, and Sunday.
Adelaide (dep.), 9.10 a.m., Thursday, Saturday, and Monday.
Kalgoorlie (arr.), 5.20 p.m., Friday, Sunday, and Tuesday.
Perth (arr.), 9.45 a.m., Saturday, Monday, and Wednesday.

On the 3-ft. 6-in. gauge section between Perth and Kalgoorlie the through train is known as the Westland, and a saving of 2 hr. is effected by it as compared with the previous best times. Between Perth and the Eastern States capitals a whole day is saved.

Features of the Westland are a lounge car fitted with comfortable chairs and card tables, and an improved type of coupler throughout, making for smoother running, starting, and stopping.

As this service is intended primarily for Interstate passengers, local passengers to and from intermediate stations between Perth and Kalgoorlie—who may use these trains if there is accommodation available—have to take sleeping berth and meal tickets, as is also necessary on the other sections of the service.

Financial Results

The financial results for the quarter ended March 30, 1938, showed a surplus of £97,448 after payment of working expenses and interest. For the corresponding quarter of 1937 the profit was £9,382, so that the current year's figures showed an improvement of £88,066. The following statement sets out the figures for the two quarterly periods concerned, together with the financial results of the nine months ended March 31 of the last three years.

It will be seen that the figures for the nine months of the current year indicate a loss of £30,354, against a loss of £93,312 for the corresponding period in the immediately preceding year, representing an improvement of £62,938. The increase of £128,349 in the earnings for the quarter was due chiefly to heavy timber shipments overseas and a free movement of wheat to the seaboard. The increase of £40,000 in working expenses was due partly to higher wages now operating, and partly to the extra costs entailed in handling the additional traffic.

—	Three months ended March 31		Nine months ended March 31		
	1938	1937	1938	1937	1936
	£	£	£	£	£
Earnings	1,035,000	906,651	2,760,000	2,630,733	2,620,046
Working Expenses	682,402	642,119	2,027,254	1,959,658	1,849,541
Net revenue ...	352,598	264,532	732,746	671,075	770,505
Interest	255,150	255,150	763,100	764,387	777,874
Profit (+) ...	+ 97,448	+ 9,382	—	—	—
Loss (−)	—	—	− 30,354	− 93,312	− 7,369

Train-mileage during the quarter totalled 1,781,658, an increase of 164,600 train-miles over the corresponding quarter of 1937. The principal increase was in goods mileage, occasioned through additional goods traffic. Passenger mileage increased slightly with a corresponding drop in mixed train mileage, brought about through the substitution of diesel-electric railcar services for mixed trains. The six diesel-electric railcars obtained from England for country branch lines have all been placed in traffic, and have passed what might be termed the experimental stage with flying colours. The advent of this modern means of transport has been most favourably received in the country districts, and gives every encouragement for formulating a policy of further development along similar lines.

NEW ZEALAND

Workshops Extension

The staff at the Otahuhu (Auckland) railway workshops now numbers 1,463, a record for the establishment. So large is the volume of work that certain machines and equipment in the structural and machine shops are being used by a second shift between 4 p.m. and 12.30 a.m. on five nights a week. The structural shop is being extended at present to cope with an increased volume of work on bridges and rolling stock. Plans have been prepared and material is on order for the enlargement of the trimming shop. Work is in progress on plans and quantity lists for extensions to the car shops (repairs and joinery), the wagon shops (repairs and new rolling stock), the machine shops, and the carbide storage shed.

Apprentice Education

The railway workshops are giving a lead to other employers in the provisions made in them for the training of apprentices. In order to ensure that apprentices engaged for employment in these shops may have every opportunity to become skilled craftsmen, the department has arranged a very thorough system of tuition for use in each of its workshops. At Otahuhu, for instance, there is an apprentice instructor employed full time in giving tuition on the theoretical side of the apprentices' trade work. Each apprentice is given three hours' tuition during working hours each week for the first three years of his apprenticeship, and in addition he is required to attend night classes at a Technical College. The effect of this system is seen in the fine quality of workmanship for which the railway workshops of the Dominion have a well-earned reputation.

INDIA

Punjab Mail Disaster Inquiry

According to the final report of the Senior Government Inspector of Railways, the accident to the 5 up Punjab mail on the night of June 7 between Madhupur and Jasidih stations on the East Indian Railway is attributed to sabotage. He states, as a result of his investigations, that there can be no doubt that the derailment was caused by the wilful removal of a rail from the left side of the track. The Deputy Inspector-General of Police, Bihar, is in agreement with this conclusion. That the train was running at normal speed is deduced from an examination of the guard's journal and station records, and the guard's estimate of 40 m.p.h. as the speed of the train at the time of the accident is accepted. A goods train had passed this section in the up direction about 50 minutes ahead of the ill-fated Punjab Mail. The driver of this train saw nothing unusual, though the fireman noticed two men with lamps on the line near the site of the derailment. He did not report the fact as it was nothing unusual to see people on the line.

G.I.P. Oil Trains

In February last, the Great Indian Peninsula Railway introduced an innovation in the transport of oil, which seems to have been well received by those interested in the oil trade. A special train, carrying only oil, either in tank wagons or in tins in wagon loads, is despatched every morning from Bombay and reaches its destination, Bhusawal, a distance of about 275 miles, the same evening. Consignments for intermediate stations are delivered *en route*, while bookings for stations beyond Bhusawal are forwarded from the latter station. During the last few months the oil train has carried a substantial traffic, about 65 per cent. of which was booked for Bhusawal and onward. Though this special has enabled merchants to obtain delivery of their requirements in quicker time, the advantage of a notable decrease in leakage and damage in transit is no less important a feature of the new facility. From the point of view of railway transportation, the running of the oil special eliminates shunting and re-marshalling of oil wagons in yards *en route*, and the accelerated transit enables a quicker turnround of wagons.

Mysore Railways

Addressing the Representative Assembly recently, Sir Mirza Ismail, Dewan of Mysore, explained his plans for the extended exploitation of the vast natural resources of the State. Railways and electrical works provided the Government's main commercial sources of revenue. The Government of Mysore had recently acquired full control of its railway system, the expansion of which needed further capital outlay. Sir Mirza said that Mysore's one great ambition as regards railway expansion was to secure direct access to the ports on the West Coast, particularly to the new harbour at Cochin. The realisation of this ambition would, he confidently hoped, increase the earning capacity of the State's railway system, in which a sum of Rs. 6½ crores had already been invested.

New Railway Proposed

At a recent meeting of the Cochin Harbour Advisory Committee, further consideration was given to the proposal for the construction of a railway from Trichur to Kollengode. The Advisory Committee considered that this line was an indispensable adjunct to the development of the harbour. The South Indian Railway has submitted an estimate of Rs. 45,000 for carrying out an engineering survey and a revised traffic survey of the project. The Cochin Government has proposed that the expenses should be shared by all the parties interested in the harbour, viz., the Governments of India, Cochin, and Travancore.

EIRE

Combined Rail and Air Bookings from Great Southern Stations to English Airports

It has been arranged with the Irish Sea Airways—operated jointly by Aer Lingus, Teoranta, and West Coast Air Services Limited—that from July 1, 1938, passengers are booked from any Great Southern station more than twenty miles from Dublin to certain airports in England. The combined rail and air tickets are subject to the conditions of carriage, bye-laws, regulations, and conditions published from time to time in the timetables or notices of any company upon whose undertaking the ticket is available.

Appropriate rail tickets are issued for the rail part of the combined journey and the passenger is given at the booking station an exchange voucher for the required air journey. However, no exchange voucher for air travel may be issued to any passenger for a particular service unless that passenger has reserved accommodation for the air journey.

Where application is made through the stations for reservation, if time permits such application may be posted direct to the air company's office, but if sufficient time is not available a telegram or telephone message must be used and the expense must be borne by the intending passenger. As no accommodation for air travel can be held without payment of 25 per cent. fare deposit, this amount must be obtained before the procedure in question can be followed.

The usual reduction for children's fares and for the conveyance of luggage will apply as far as the rail portion of the journey is concerned.

As the termini in Dublin of the Great Southern Railways are some distance from the airport, passengers must find their own way to or from the airport; the combined fairs do not include conveyance across Dublin.

SOUTH AFRICA

Financial Results

The complete results of working for the financial year ended March 31, 1938, are now available and show a surplus of revenue over expenditure of £335,132. The total revenue figure was £39,233,639, and expenditure amounted to £38,898,507. The revenue for the year under review was greater by £1,990,490 than that for the previous financial year, and expenditure increased by £3,385,840. The actual earnings of the different branches were as follow :—

	£
Transportation (including subsidiary services, interest on investments, and miscellaneous)	36,800,253
Harbours	2,154,412
Steamships	122,316
Airways	156,658

Under each of the above heads increases over the earnings for the previous year were reflected.

The following special appropriations from revenue were made during the year 1937-38 : Betterment Fund, £1,000,000 ; deficiency in Pension and Superannuation Funds, £487,000 ; Rates Equalisation Fund, £1,000,000 ; reduction of branch line capital, £250,000 ; Renewals Fund, £1,850,000 ; responsibility allowance, £482,798 ; writing out of capital account discount and expenses on pre-Union capital, £500,000 ; writing out of capital account residual value of sleeper plantations, £253,154.

UNITED STATES

S.P.R. 30-mile Main Line Diversion

The Bureau of Reclamation is to construct a great dam at Shasta on the Sacramento river, 560 ft. in height and involving the inundation of 27 miles of the Southern Pacific Railroad main line. As a result the survey is just being completed of a re-location of 37 miles of that line, the realignment being some 30 miles in length through difficult country. This diversion will involve the construction of 12 tunnels up to half-a-mile in length individually and five miles in aggregate, and also 8 bridges totalling 11,000 ft. long, the highest of these being no less than 470 ft. high and 3,300 ft. long.

Unique Tunnel under Dam

Meanwhile, to enable work on the dam to proceed prior to the completion of the railway diversion, a 1,821-ft. single-line tunnel is being bored below the dam site to carry the railway traffic. This tunnel will subsequently be used to let the Sacramento river water pass under the dam whilst the latter is building. The cost of the permanent diversion is estimated at $15,000,000, and that of the temporary tunnel diversion $500,000. We are indebted to our American contemporary, the *Rail-*

way Age, for this information. (*See* also editorial note on page 147)

New Pennsylvania Rolling Stock

The Pennsylvania Railroad has awarded $6,330,000 worth of new equipment trust certificates, the proceeds of which are to go towards the cost of building 1,000 gondola cars, 20 electric passenger locomotives, and other smaller items of rolling stock, estimated to cost $8,440,000 in all. The goods stock will be built at the Altoona shops of the company, and the chassis of the locomotives also, which will be of the GG-I type. The gondola cars will be of 70 tons capacity and be 52 ft. 6 in. in length. Of the other freight stock there will be six 120-ton well wagons, and two 200-ton flat trucks for abnormal loads.

CEYLON

New Designation for Principal Officers

The present designations of three of the principal officers of the railway are to be abolished in the near future. These are the Deputy General Manager, Commercial; the Deputy General Manager, Operating; and the Deputy General Manager, General. In future the officers in charge of these three branches will be called Superintendents. The change of designation, which, if approved, has to be carried out by an amendment to the Railway Ordinance, is now receiving the attention of the Executive Committee of Communications and Works.

GERMANY

State Absorption of the Munich Localbahn

The Reichsbahn has taken over the lines belonging to the *Localbahn* Company of Munich, as from June 16, 1938, and is working them. The undertaking comprises the following sections:—

Bad Aibling-Feilnbach ..	7·50	miles.
Fürth-Cadolzburg	7·76	,,
Isar Valley	31·30	,,
Marktoberdorf-Füssen ..	18·95	,,
Murnau-Oberammergau ..	14·70	,,
Niederbiegen-Weingarten ..	3·03	,,
Sonthofen-Oberstdorf ..	8·18	,,
Türkheim-Wôrishofen ..	3·23	,,
Walhalla line	13·70	,,
Ravensburg - Baienfurt (tramway)	2·26	,,
Meckenbeuren-Tettnanger	2·66	,,
Total ..	113·27	,,

Traffic on the Oberstdorf line has much increased of late years and considerable expenditure is required to bring the equipment of the line into condition to deal with it; the terminal stations need complete rebuilding. The Reichsbahn alone is in a position to carry out the necessary programme. The replanning of Munich and enlargement of the railway facilities includes bringing the Isar Valley line into the new central station and its working by the Reichsbahn is considered desirable on this ground alone. Similar arguments apply to the Füssen and Oberammergau lines, and, as to take these over also would leave little of value to the concern, it has been deemed better to absorb the remaining sections as well.

It is stated that this does not affect the general principle already announced by the Government that the private lines are to be left as much as possible without interference. The conditions in this case are exceptional.

Public authorities have already had to assist the concern to avoid its closing down. Many sections have been worked at a loss for some years. In 1936 the loss was 450,000 RM., but this was made up by profitable working on other sections, such as the Oberammergau line, a result made possible only because the fares on these routes are rather high. The shareholders are to receive bonds representing 90 per cent. of their shares, which, considering the position of the concern, is a good bargain for them.

BELGIAN CONGO

Results in 1937

The Katanga Railway, running north from the Rhodesian frontier, to Bukama, carried 60,300 passengers in 1937, compared with 37,193 in 1936, and 2,722,912 tons of freight, compared with 1,339,813 tons, representing increases of 62 and 103 per cent. respectively. The net profits increased by 123 per cent. to fr. 46,501,747 Belgian; the large increase in business was due to the revival of trade in the copper industry. The Upper Congo & Great Lakes Railways, the rail-river-lake system connecting Bukama with Stanleyville, Albertville, Kigoma, and Lake Tanganyika, carried 34,373 passengers in 1937, compared with 30,248 in 1936, and 118,240 tons of freight, against 99,726 tons. The net profits rose by 125 per cent. to fr. 11,283,556.

HONDURAS

The Railways of the Republic

No major constructional development has taken place in the railway system of Honduras during recent years, according to the "Report on Economic and Commercial Conditions in the Republic of Honduras," issued by the Department of Overseas Trade. There are 1,481 km. of line in operation, of which 1,377 km. are owned by the fruit companies. The railways, all of narrow gauge, extend along the north coast of the Republic and serve the banana plantations and the Caribbean ports. Regular passenger services are maintained. The National Railway, operated by one of the fruit companies, connects Puerto Cortes with Potrerillos, some 60 miles inland. The line joins the Inter-oceanic Highway and renders it possible to reach the capital by train, car, and ferry boat over Lake Yojoa, in a day. The original project, periodically revived in the past, to carry this railway across Honduras, thus connecting the Atlantic and Pacific coasts, appears to have been finally dropped. There are no railway facilities in Southern Honduras, all goods being transported from the coast to Tegucigalpa by road lorry.

JAPAN

Largest Airport Opened

The new airport at Yonago in the Tottori Prefecture, the largest in Japan, was opened on June 10. It is fully equipped with all the most modern facilities, and its position on the shore of the Sea of Japan is very central, especially for the inter-capital airline between Tokyo and Hsinking.

The Kobe Floods

The recent floods in Kobe are reported to have damaged the railways in the neighbourhood very severely. The underground railway soon became inundated with water and mud, and trains were stopped by them in the tunnels. The State Railways line between Kobe and Osaka had to be closed, and other railways were completely disorganised. The total damage to railways is estimated at over £2,000,000. Loss of life has been very heavy; at least 700 people are known to be dead or missing, and thousands of buildings have been demolished.

CHINA

Eurasia Aviation Corporation

The corporation's new airline linking Hong Kong with Yunnanfu, in the far west, was formally inaugurated on June 10. The plane making the maiden flight left Yunnanfu at 10.50 a.m. and reached Hong Kong at 6 p.m.

The Hankow—Sianfu and Sianfu—Chengtu services of the corporation, which had been suspended for some time, were resumed on June 18 and 19 respectively, and the Sian airport was again booking passengers, but at reduced fares on both lines.

The Railways and the War

The bridge across the Kwei River on the Tientsin—Pukow Railway is reported to have been repaired by Japanese military engineers, enabling the line to be used throughout.

The National Government has issued a mandate commending the staff of the Lung-Hai Railway for recovering under difficulty about 60 locomotives and 600 carriages and wagons which could not be got away when the Japanese forces captured Lanfeng. Upon the reoccupation of the city by Chinese forces, the Chinese railway engineers hurriedly repaired the track and damaged bridges, and the staff were able to get the stock away. Heavy fighting was going on in the vicinity at the time.

XUM

NEW ARGENTINE COACHING STOCK

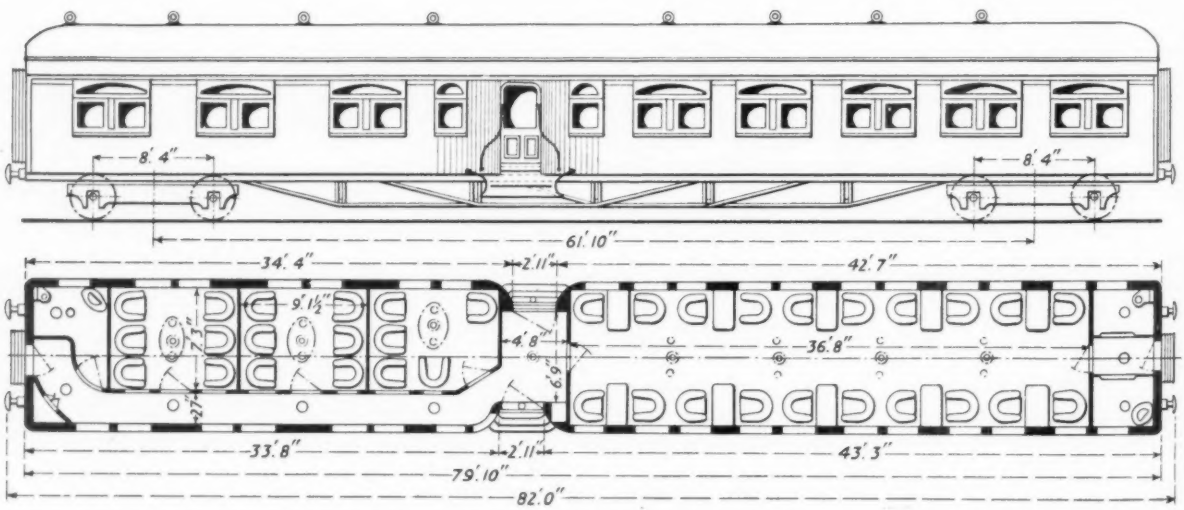
New Pullman and sleeping cars, Buenos Ayres Great Southern Railway, for the Bariloche service

TO meet the demands of the increasing summer holiday traffic to the Southern Lakes, the Buenos Ayres Great Southern Railway, in December last, put a new series of Pullman and sleeping cars into operation on the service to San Carlos de Bariloche, worked in combination with the Argentine State Railways. In the construction of these cars the only materials purchased in their finished state were the wheels and axles, electric lighting sets and minor details for furnishing. The new chairs for the Pullman cars, although not manufactured in the railway workshops, were also made locally. The steel and ironwork for the underframes and bogies was imported, and most of the timber used was South American.

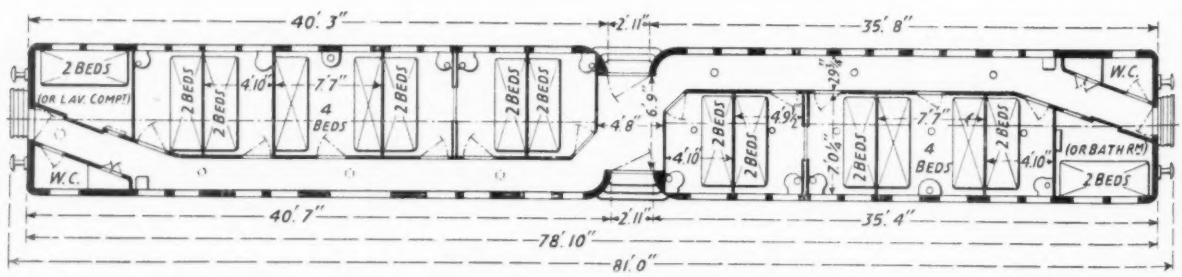
Both types of coach are divided into two portions by a central entrance, the two sets of compartments in the sleeping cars being placed diagonally opposite each other, to equalise the weight distribution. The Pullman cars are divided into two sections, one being the main saloon, furnished with 20 movable chairs with a small folding table between each pair, the other half of the coach being sub-divided into three private compartments for the accommodation of families or small parties. The bodies are of pitch pine mounted on steel underframes built on the Livesey-Gould cantilever principle. The exterior match-boarding is of cedar. The roofs of both types of coach are composed of two layers of Paraná pine, and the ceilings are finished with mill boarding.

Each coach is mounted on two four-wheel bogies of the company's standard type, provided with swing bolsters supported by full elliptical springs; side friction plates are not fitted, the drive being taken through radial pull rods. The final suspension is through helical springs placed on each side of the axlebox and transmitting the load to the top of the box through a short compensating beam.

The coaches are equipped with the B.A.G.S. standard buffing and drawgear, consisting of side buffers, standard screw couplings, and through drawgear. They are fitted with vacuum brakegear having 21-in. diameter Westinghouse diaphragm type brake cylinders, each cylinder actuating the brake on one bogie. Cast steel brakeblocks with separate cast iron shoes, one per wheel, are fitted.



Side elevation and plan of the Pullman cars. Note the trusses of the Livesey-Gould type underframe and the general seating arrangement



General arrangement of the sleeping cars. In some of them the end compartments are fitted as lavatory and bathroom, and in others as sleeping compartments. The exteriors generally resemble those of the Pullman cars

AN EFFECTIVE FASTENING FOR FLAT-BOTTOM TRACK

By the use of K type clips and soleplates a secure anti-creep fastening is obtained independently from rail to soleplate and soleplate to sleeper

A RAIL fastening of interest to users of flat-bottom rails has lately been developed by Charles Richards & Sons Limited, of Darlaston. The standard K type clip, intended for use with steel sleepers, was described in *The Railway Engineer* of April, 1933, and the new clip is an adaptation of this, enabling it to be used with wooden sleepers. As can be seen from Fig. 1 there is a steel bearing plate of special rolled section. A further modification lies in the elimination of the tail-pieces on the clips themselves. At the end remote from the rail each clip rests on the bearing plate but does not enter a recess or hole therein. However, the over-riding clip

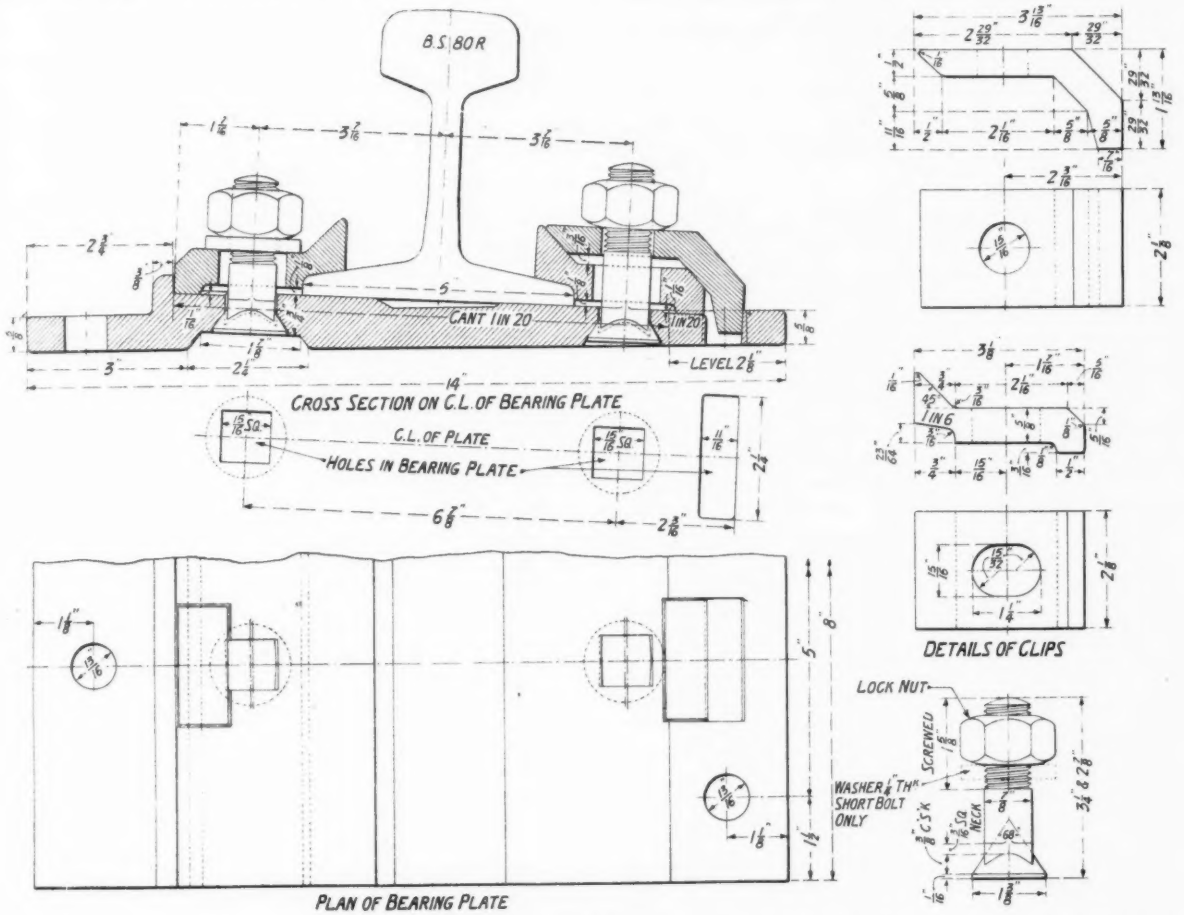


Fig. 1 (above) K type fastening of rail to soleplate

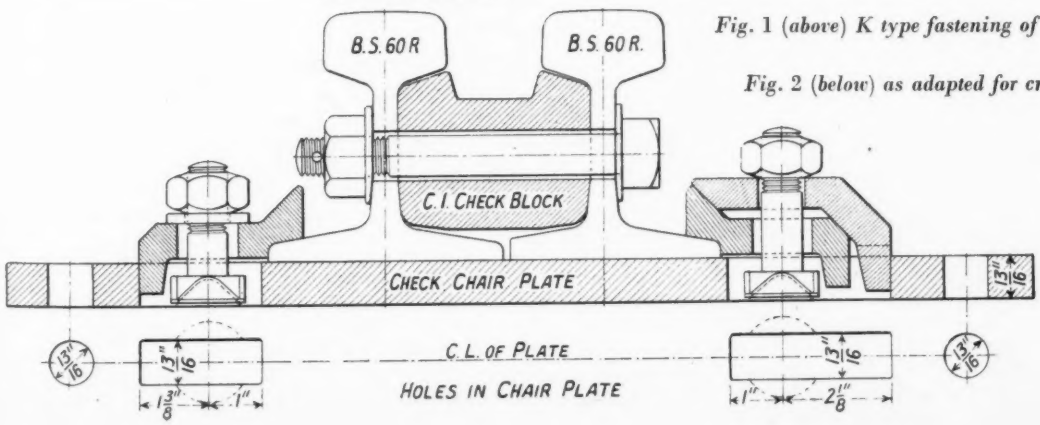


Fig. 2 (below) as adapted for crossing work

has a tail as in the standard design, and this enters a rectangular opening in the bearing plate. Its abutment against one face of this opening enables the over-riding clip to exert a powerful side thrust on the clip beneath it so that, being restrained by the other clip, which is prevented from sideways movement by a clip on the bearing plate, the rail is firmly secured both as regards vertical and transverse tendencies to displacement. Longitudinal movement or creep would thus be obviated by the arrangement.

The bearing plate and the clip bolts are so made that the sleeper top requires no recessing. The bolts can be removed by releasing the clips and knocking the bearing plate sideways off the sleeper, in the same way that a cast iron chair is removed from bull-headed track without disturbing the rail.

Fig. 2 shows how the K type clip is used in conjunction with timber sleepers at points and crossings. Here again the design of the bearing plate and the clip bolts obviates recessing the top face of the sleeper. It will be noticed that, in this application, the bearing plate is made from flat bar, so that at least one of the clips must be made with a tail to enter a recess therein. The other is made with a tail to give interchangeability.

MR. CANTLIE ON MINIMISING THE RISK OF TELESCOPING

The following article, by Mr. Kenneth Cantlie, Technical Adviser to the Chinese Ministry of Railways from 1930 *to* 1937, *appeared in* The Daily Telegraph and Morning Post *of June* 22, 1938

DISCUSSION as to the desirability of British railways adopting all-steel coaches for passenger trains will again be raised by Colonel Mount's findings on the Castlecary railway disaster.

Agitation in favour of such a change in British practice has arisen after each of the serious accidents in recent years when telescoping or the shattering of coaches has occurred.

But on each occasion counter-arguments have been advanced which either claimed categorically that all-steel cars were, in practice, no safer than wooden coaches, or that modern British carriages were already composed mainly of steel and that, when provided with buckeye or other strong American-type couplers and draught-gear, were perfectly satisfactory.

A Grim Alternative

It has been said by responsible persons that telescoping of carriages in a collision is, in certain circumstances, an actual blessing. By the telescoping of two or more carriages the remainder of the train is allowed considerably more distance in which to come to a stop, thus lessening the shock to passengers not in the telescoped vehicles. It is the opinion of this school of thought that were the whole train composed of non-telescoping stock the sudden stoppage of the train would fling passengers from their seats, injuring or killing them. The alternatives, according to these authorities, are death for a few or injuries (and risk of death) for many.

This seems an unnecessarily gloomy view of the position. In the United States, where all-steel stock has been standard for some time, experience shows that while casualties still occur in collisions, their number has been much reduced as a consequence of abolishing wood-bodied coaches.

At one time, so strong was the prejudice of the American travelling public against travelling in wood-bodied cars, that the remaining cars of that type had to be camouflaged with external steel sheeting in order to relieve the acute shortage of all-steel cars. There is no doubt whatever that public opinion in the United States would never tolerate any proposal to revert to the wood-bodied stock of past days.

What is a collision? In essence simply the sudden starting or stopping of a train. If a train travelling at a mile a minute strikes either another train or some stationary object, it may stop in as short a distance as 50 ft. instead of the normal 700 ft. or 800 ft.

Those who oppose the rigid all-steel car contend that this sudden stoppage would injure and kill more passengers than does telescoping. But is this actually so?

Stopping at 40 m.p.h.

Let us take a wider view, for in railway work one is apt to have Victorian mental inhibitions.

A speed of a mile a minute, still thought of with a certain unconscious awe by most railwaymen, is not, in fact, a high speed. It is only half as fast as Sir Malcolm Campbell's motorboat, and only one-fifth as fast as Captain Eyston's car. And if objection is raised that these are racing speeds, let it be said that the steam locomotive has never in any circumstances reached Campbell's speed. It is difficult for railwaymen to realise that their railways which, 40 years ago, were the fastest, are now actually the slowest form of modern transport, in so far as maximum speeds are concerned.

As to a mile a minute, any family car in reasonable condition can attain it at any time. Yet, it should be remarked, none of the recent railway collisions occurred at a speed as high as this.

Compare the rates of road transport with the speed at Swanley Junction, Kent, last June, where a railway collision occurred and four passengers were killed. The train entered a siding at not more than 40 miles an hour and had an excellent "cushion" in the form of two empty carriages and a wagon which, being crushed, gave the train a comparatively smooth stop in a distance of, roughly, 125 ft.

But this stopping rate is less than normal motorcar stopping rates. Indeed, if a car driver took as long as this to come to a stand from 40 miles an hour, he would consider that his brakes needed adjusting. Yet telescoping occurred because the leading end of the first coach was lifted with the tender, thus depressing the rear end, and allowing the heavy steel underframe of the second coach to cut through the wood body of the first.

Partly-Rigid Coaches

This accident was a perfect demonstration of the reason for telescoping. Modern British carriages consist of a steel underframe surmounted by a wooden body. So long as the frames of adjacent carriages can be kept in horizontal line in a collision, telescoping seldom occurs, unless the velocity is great enough to buckle the frames. But should one underframe be raised high enough to clear its neighbour, it will smash through the wooden body.

Schemes to prevent this overriding have been many. Stronger buffers, steel sheathing, buckeye American couplers with draught-gear and Pullman vestibules—even special corrugations on the coach-ends have all been adopted at various times, and all have been of some assistance, though none has proved a certain preventive.

It would be as well to realise that these devices have failed to check overriding and to concentrate on avoiding serious results from telescoping.

The ends of the coach bodies must be sufficiently strong to resist being cut through by frames of neighbouring coaches. This means either the adoption of all-steel bodies or steel reinforcement of the wooden bodies. Both are in use in other countries, and are quite practicable.

Those who believe in telescoping point to a recent collision at Battersea, where two electric trains met on a bridge and, had they been of steel stock, might, they say, have been bounced over the parapet. The absorption of the momentum of the second train by telescoping was, they hold, inevitable and beneficial.

There are two answers to this. One is that with steel stock the energy of the second train might have been expended in pushing the first train along the track; the second is that there is no need to make steel stock rigid from end to end.

"Cushion" Devices

In Belgium steel cars have six feet at each end specially designed to crush (without telescoping) in a collision, thus not only deadening the impact but providing the rear of the train with an ever-increasing stopping distance. When combined with a luggage-van next the engine specially designed to telescope or crush in a collision, this proves an almost ideal arrangement, though it is noteworthy that the Americans, who are, of course, by far the largest users of steel coaches, have never considered the adoption of these refinements worth while.

Whatever the merits of all-steel coaches, however, their immediate introduction on a large scale is impracticable in this country.

Not only would the cost of replacing wood by steel coaches in any short term of years impose a great burden on the railways' revenue, but there are additional weighty objections such as the disturbance of the labour market by the dismissal of railway carpenters, and their replacement by platers, steelpressers, welders, and riveters at a time when such classes of labour are in great demand for armaments. The delay in installing suitable manufacturing and repair machinery would also, for the same reason, be considerable, and the diversion of labour would be unjustifiable.

Therefore, though the change to steel cars will probably come in time, it can only be by degrees and on a definite programme. The continuance of wood-bodied coaches being thus inevitable for some years, the question arises whether vehicles now in use can be improved by reinforcement and other means to resist telescoping.

Reinforced Stock

It can be done, and it is not a matter of great difficulty or expense. In other countries the device employed consists of two posts, one each side of the vestibule gangway (if used), their lower ends strongly secured to the underframe and their upper extremities braced either by two additional pillars several feet nearer the centre of the car, or by a horizontal beam braced by posts in the carriage sides in such part of the carriage as may be convenient to the general interior arrangements.

For suburban carriages, which are generally permanently coupled up in trains, this system can be modified; the ends of each train being reinforced, and the remaining cars left as they are with a new form of coupling which should exclude the possibility of the underframes overriding one another.

If simple modifications on these principles were introduced, the present loss of life through telescoping would be greatly reduced.

(*See editorial note on page* 146)

A NEW SHOCK-ABSORBER

THE Ministry of Transport Report on the Castlecary collision has revived the question of how best to minimise the danger of telescoping in such accidents, and the Monarch shock-absorber illustrated herewith is a suggested means of contributing towards this objective. This shock-absorber functions equally well under tensional or compressional shock, either form of load on the shank of the coupler causing the same movement in the assembly. It should therefore be an ideal unit for use in combination with a coupler. The movement together of the cams causes the fulcrum of the leverage system to move as the cams turn on each other, giving a variable effective strength to the spring. The greater the load the stiffer the effect of the spring. The load-travel curve becomes a parabola instead of the straight line of a directly loaded spring, with an immeasurably greater range of load, a characteristic of the utmost importance in train collisions.

It was remarked by Lieut.-Colonel Mount, the Inspecting Officer, in his report on the Castlecary accident that large-faced side buffers cannot be so efficient from the purely telescoping-preventive aspect when speed is high, as the Pullman vestibule. As all passenger vehicles are not provided with these vestibules, it is suggested that their shock-absorbing properties might be transferred to a standard position available to all rolling-stock so that every vehicle could be fitted, and in such an event the Monarch patent shock-absorbing unit would be adaptable for this purpose. In the sketch the shank is shown as adaptable for any form of standard coupler.

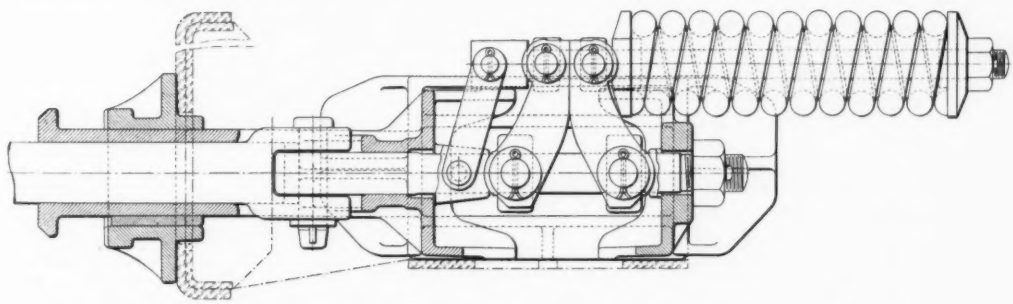


Diagram of Monarch shock-absorbing draw gear

General layout of King's Cross goods depot, L.N.E.R., showing the new inwards and outwards sheds as now transposed and remodelled

(See article on opposite page)

KING'S CROSS GOODS STATION REMODELLING, L.N.E.R.

Platform space for unloading wagons has been increased by over 450 per cent. by the transposition of the inwards and outwards sheds and by other improvements. Altogether, 540 wagons can now be loaded or unloaded simultaneously

IN order to realise the importance, size, and traffic of King's Cross goods station, as well as the necessity for the recently-completed improvements about to be described, the following salient facts should be noted. The total area of the depot is 84 acres, and during 1937 an aggregate tonnage of 900,000 was dealt with, including 17,246 wagons of returned empties. To cater for such a great volume of traffic 1,110 wagons are loaded or unloaded daily on an average, year in and year out, 530 being inwards and 580 outwards. Some 32,000 containers are also handled annually, 7,000 of which are used to convey meat traffic. The total staff required at the depot numbers 2,400, of whom 400 are clerks, 660 are cartage hands and the remainder traffic operating staff. On the cartage side there are 197 motor vehicles and 73 horse teams. The yard will accommodate 4,000 wagons, and the average number in use is about 2,000; the annual wagon turnover is some 663,000.

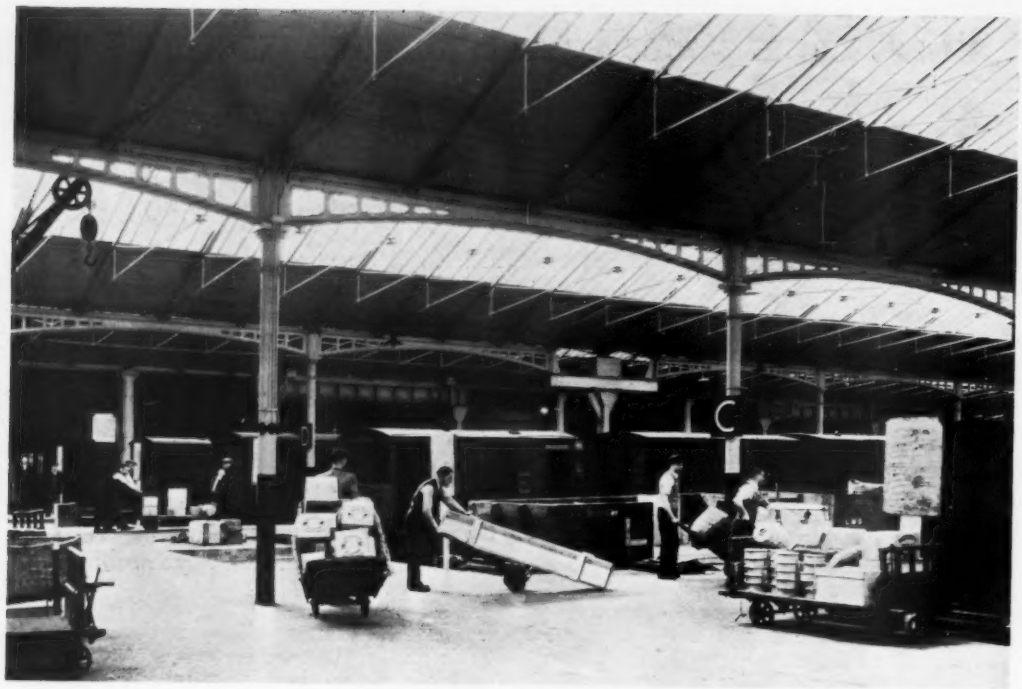
The daily average number of trains arriving at King's Cross goods is 38, and there are 30 departures, including eight of the fastest category fully braked, or No. 1 speed, and ten of No. 2 speed, partly braked, as described in THE RAILWAY GAZETTE of September 16, 1932 (page 335). Between 8.30 p.m. and 2.30 the next morning trains leave at half-hourly intervals. To ensure early morning deliveries to the Scottish markets, train No. 527 leaves King's Cross at 2.0 p.m. and the crack No. 562 at 3.35 p.m.; for early morning markets in the North Eastern Area No. 577 leaves at 4.20 p.m.; all these trains run at high speeds and convey perishables, much of the traffic being in containers. Such an intensive and urgent traffic necessitates punctuality as well as precision in yard and loading movements; and in practice it is noticeable that, as soon as a train has left, the platforms it has occupied are resupplied with empties, placed for loading within a very few minutes.

Rapid Working Essential

It will be seen, therefore, that so great a volume of traffic and such intensive train movement can be dealt with only by a very rapid turnround of stock, and it is to this end and to the prompt delivery of inwards goods that every effort is directed at King's Cross. The former

One of the outwards sheds with an express goods train being loaded from road vans. The cranes are hydraulic, with the rams above them among the roof trusses. It should be noted that the roof is the original one, erected in 1850

XUM



The principal outwards shed, showing brake vans in position on trains being loaded at some of the nine new platforms

Another view of the principal outwards shed showing loading in progress and destination board. Note the size and good lighting of this shed

shortage of wagon unloading space proved an ever-increasing handicap to the latter aim, and together with the urgent necessity for improved wagon turnround, this was the prime motive for the remodelling scheme. It is significant that so successful has the latter proved, that incoming trains are now shunted and the wagons placed in position for unloading within 30 min., and road delivery begins within 40 min. of the arrival of each train in the yard. As 200 of the 530 wagons received daily contain perishables, this prompt despatch is all-important.

A Few of the Special Traffics Handled

Before turning to the work of remodelling it may be of interest to note a few of the special lines of traffic dealt with at King's Cross. As well as the 32,000 containers, some 100,000 tons of potato traffic are handled annually. In all, 39 warehouses on the premises are occupied by potato salesmen, and, during the height of the season, the wagon stock loaded with potatoes on hand on any one day amounts to about 500. Other daily seasonal traffics characteristic of this depot and their volumes are: 100 wagons or 200 tons of green peas, 23 wagons or 60 tons of rhubarb, and 35 wagons or 140 tons of celery. Altogether, an average of 200 wagons of fish and other perishables arrive at King's Cross each day. One of the heaviest general traffics dealt with, however, is in bricks from the Peterborough area.

The Remodelling Scheme

For reasons already explained, an extensive remodelling scheme was drawn up and sanctioned, and work upon it began in March, 1936. The principal features of the scheme involved the transposition of the inwards and outwards sheds, and their alterations to meet requirements, as well as revised yard, shed, and cartage working methods. It was essential that the whole traffic of the depot should continue uninterruptedly during the carrying out of the alterations, a consideration which greatly complicated the work, and it is to the credit of all concerned that not a single wagon had to be diverted elsewhere during the remodelling. To achieve this end, however, work had to proceed in a more piecemeal way than would otherwise have been necessary, and consequently it was not until March 7, 1938, that the transposition of the sheds and the remodelling generally were completed. The immediate result was greatly improved deliveries in London, and more prompt acceptance of trains; also the margin between the time of unloading and despatch of outwards goods was considerably reduced.

A furniture removal container being lowered on to a lorry by one of the Rapier mobile cranes in the yard

One of the two new Cowans Sheldon traversers conveying a wagon from one outwards road to another. The foreman in the background is operating the press-button control

Details of the Work

In the yard three additional arrival roads were provided and various others were rearranged to expedite shunting movements. In the outwards sheds no fewer than nine additional platforms were built, and two 22-ton electric traversers were supplied by Cowans, Sheldon & Co., Ltd., of Carlisle, and installed so as to serve all platforms. These traversers, which are of a new type, together serve 14 tracks, one normally working over the eastern and the other over the western half of the traverser road. A special feature is the simplicity of their control, similar to that installed in passenger-controlled lifts; by pressing a numbered button the traverser travels to and stops at the road bearing the corresponding number, and a stop button is also provided so that spaces between roads can also be

used, or an emergency stop made. The drive is by 1¾-in. circumference endless rope under spring tension, and is operated through spur wheels and worm gear by two direct coupled motors in tandem, one giving 10 b.h.p. at 1,430 r.p.m. and the other 3½ h.p. at 440 r.p.m., the former being for high and the latter for slow speeds. The speeds of the traversers range from 46 to 120 ft. per min.

Cartage Traffic Facilities

In addition, the number of berths for cartage vehicles in the outwards sheds was increased to 75, and greatly increased widths of openings in the walls were provided at both sides of the sheds, a measure that has considerably facilitated the movement of road vehicles into and out of the circulating area serving the platforms. A pair of 20-ton automatic cartage weighbridges has also been supplied by Henry Pooley & Son Limited, and installed in the outwards side. Each weighbridge measures 20 ft. × 8 ft. and there is a central weigh office between the two weighbridges. Pooley quadrant indicators are used, enclosed in one cabinet, and no manipulation of poises is necessary; the weight indication at eye level is instantaneous. The major graduations are given automatically on the left of the indicator chart and the minor graduations are read from left to right on a vernier scale. A feature of the equipment is the lighting to give shadowless reading.

In the principal inwards shed a new monorail 30-cwt. crane, built by Cowans, Sheldon & Co. Ltd., has been installed. It has a fixed lifting radius of 9 ft. and the sling can be raised to a maximum height of 13 ft. 9 in. above platform level. The crane is capable of hoisting a 30-cwt. load at 50 ft. per min. with its 7½-h.p. motor, and the slewing speed at the hook is 200 ft. per min.; a 3-h.p. revolving motor being used. The travelling 12½-h.p. motor gives a speed of 300 ft. per min. along the single 60-lb. rail at platform level and the 12-in. × 3½-in. guide channel above, the runway being, as shown on the accompanying plan, about 600 ft. in length altogether. The motors were made by Crompton Parkinson Limited. The monorail wheelbase is approximately 7 ft. 6 in.

Throughout the sheds and yard a much improved system of lighting has been provided. For lifting miscellaneous traffic and the large number of containers passing through the depot, three 6-ton Rapier petrol-electric mobile cranes are in use, manufactured by Ransomes & Rapier Limited, of Ipswich. These are of the firm's standard type mounted on four solid-rubber-tyred wheels, the rear pair being close together and capable of turning through 90 deg. to allow of slewing castor-wise.

The following table gives the capabilities of each of these cranes:—

	Ton	Kg.
Working Loads—		
(*a*) Jib at minimum radius with two part rope block	3·50	3,556
(*b*) Jib at minimum radius, with four part rope block	6·0	6,096
(*c*) Jib at maximum radius	2·50	2,540
Hoisting Speeds per min.—	Ft.	mm.
Lifting loads (*a*)	35	10,670
Lifting loads (*b*)	23	7,010
Lifting loads (*c*)	50	15,240
Travelling Speeds per hr.—	Mile	Km.
Loaded and according to condition of ground, up to	3	4·82
Light, up to	5	8·04

These cranes will lift and travel with a fully-loaded 6-ton container.

Improvements Effected

As a result of these improvements there are now available on the outwards side of the depot 11 platforms capable of serving at any one time as many as 190 wagons. In addition the adjacent outside roads have an aggregate capacity of 104 wagons, so that altogether, 294 wagons can be loaded at once.

The greatest improvement effected is, however, on the inwards side, where 186 wagons can now be placed in the sheds for unloading at platforms simultaneously, whereas the number prior to the alterations was only 35. Some 60 wagons can also be unloaded on outside adjacent roads, giving a total of 246 wagons at a time. The reduction in time between the arrival of a train and the placing of its wagons for unloading to half-an-hour or less, is also directly attributable to the remodelling. In fact, the alterations recently completed have increased the general capacity and efficiency of this, the largest goods depot on the L.N.E.R., and brought it up to modern requirements.

S.R. Buffet Car Plaques

(*See editorial note on page* 147)

Close-up views of the antique brass plaques fitted in the new buffet cars of the Southern Railway, for the West Sussex and coastal electrified services. These vehicles were described in our Electric Traction Supplement of June 24, and illustrated on pages 27-8 of our July 1 issue. The plaques were specially designed by Mr. G. Kinger Gray, and the Kupron process used in their reproduction was carried out by Mr. T. S. H. Skelton, at 27, Upper Ground, Blackfriars

FURTHER PROGRESS OF THE TRANS-IRANIAN RAILWAY

Since our last description of this great construction work, the northern part, from Bandar Shah, on the Caspian Sea, to Teheran, has been completed, and all tunnel headings in the south have now been driven

IN our issues of July 26, 1935, and June 11, 1937, there appeared descriptions of this remarkable construction work and its progress, with illustrations of the more interesting features up to those dates. Subsequently, however, further great strides have been taken towards completion—despite the difficulties constantly encountered—chief among them being the opening for through running from the Caspian to Teheran, and, still more recently, the completion of the piercing of the Luristan mountains in the south.

Reverting for a moment to the remarkable construction work that was necessary to scale the Elburz mountains and develop length sufficient to enable a reasonable gradient to be used, it will be remembered that the most striking feature of the climb is the great zig-zag, with spirals mainly in tunnel at each reverse; we are now able to publish a particularly instructive illustration of this fine section of line. Another illustration is the entry of the first train to the new station at Teheran, an occurrence marking the completion of the northern part of the route, and giving the capital rail connection with the outer world. Some of the major engineering works on both northern and southern sections of the construction are also illustrated.

The Canyon Section

More recently, efforts have been concentrated upon the almost more difficult southern part of the construction and, in particular, on the so-called Canyon section through the Luristan mountains, that form the southern escarpment of the central Iranian plateau. Contract No. 7 for this section was let to the British firm of contractors, Richard Costain Limited, of London, which recently had the satisfaction of announcing the meeting of the headings in the last of the 13 tunnels, piercing this broken and rocky barrier.

The primary difficulties of this section lay in its almost complete inaccessibility, precipitous barren terrain, great variations of temperature, and total absence of even paths let alone roads. As well as the great difficulty of making service roads, the eleven British engineers of the firm had to contend with a formidable death-roll among the labour, which was most difficult to obtain and retain on the work. The intense heat also made their own work extremely arduous. The cost of this section of line was estimated at about £1,000,000. Between the tunnels deep ravines and the torrential Ab-I-Cesar river—which the line crosses and recrosses—have to be bridged, and both the service road and railway formation have had to be cut out of precipitous gorges and mountain sides where there is always danger of landslides. Now that all the tunnel headings have been driven, it is possible to follow the railway alignment comparatively closely throughout.

General Remarks

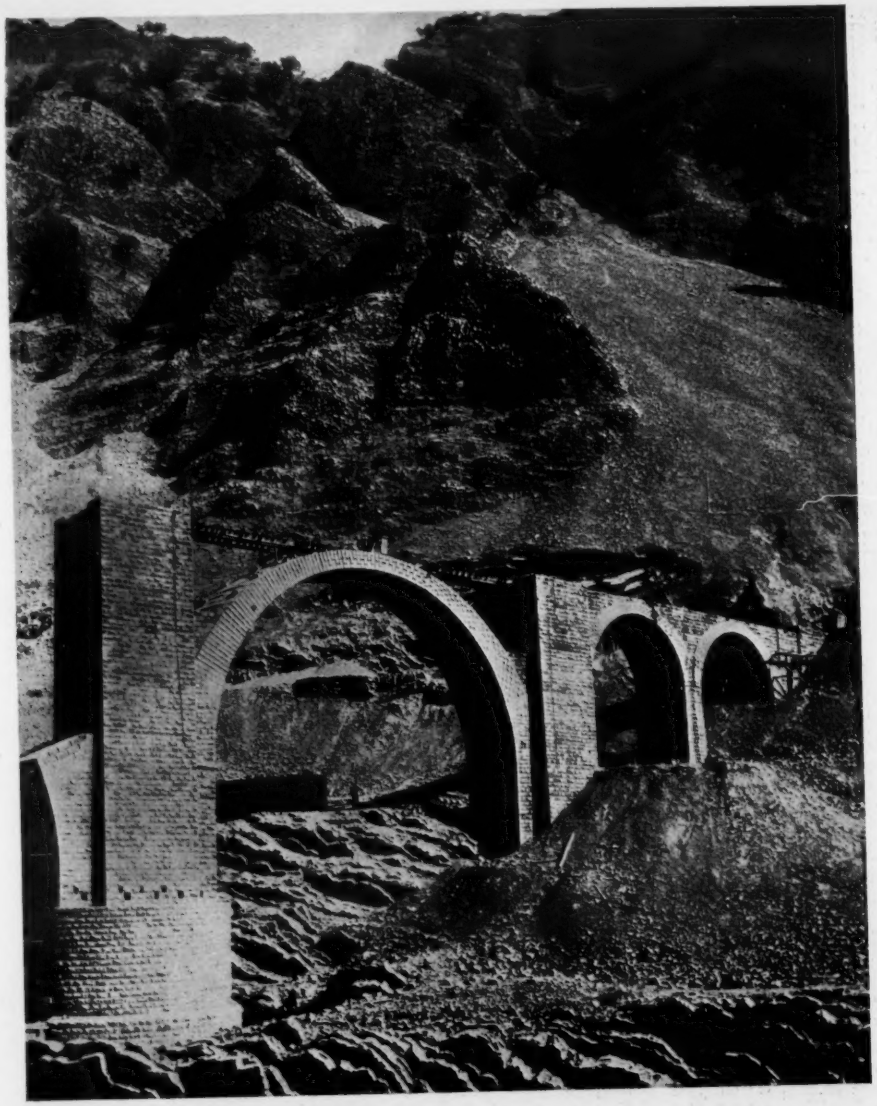
More than half of the great work is now completed; its total length is given as 808 miles and the estimated cost as £30 million, a sum that is being raised largely from State royalties on oil. The line will give greatly improved communication with the South Iranian oilfield, and it is proposed to use diesel railcars and oil-fired locomotives throughout the whole route when it is open. It will be remembered that the steepest part of the northern ascent is worked by Garratt locomotives built by Beyer Peacock & Co. Ltd., which firm has also supplied some useful 2-8-0 engines for the southern section of this line. The latter engines were described in our issue of October 5, 1934, and were illustrated in service in our article of July 26, 1935.

Sketch map showing the course of the Trans-Iranian Railway, on the construction of which considerable progress is being made

Panoramic view of the three great zigzags by which the line climbs to cross the Elbruz Mountains in its northern ascent from the Caspian plains to the central Iranian tableland. Note the numerous slips on the hillsides

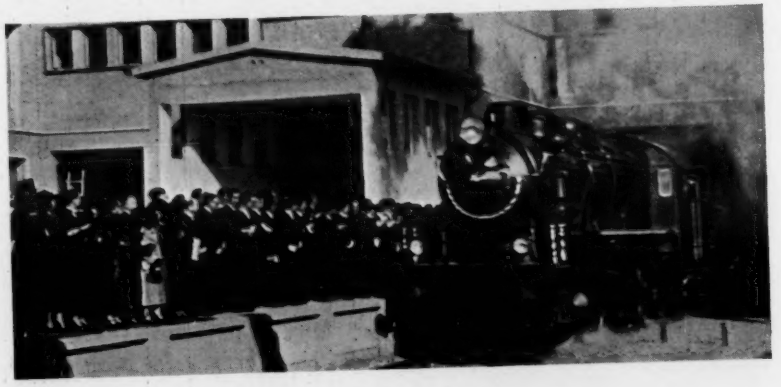
Above and centre: two views of an arch bridge being built across a gorge

Above: one of the galleries built to carry a stream and landslips over the line



A viaduct and typical shale hillside on Costain's length, Luristan

Two types of wayside station building at (upper) Do-kouh and (lower) Zara



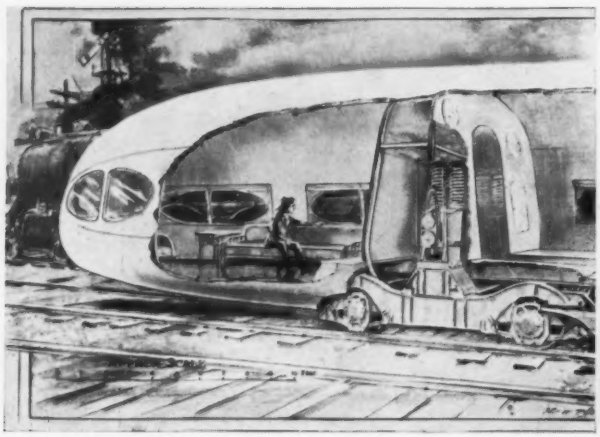
The first train entering Teheran station

SCENES ON THE TRANS-IRANIAN RAILWAY CONSTRUCTION

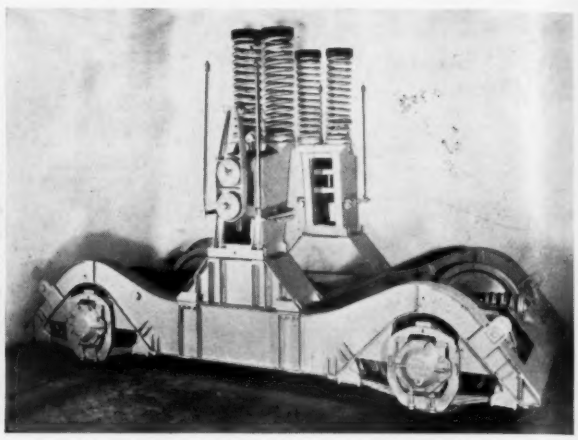
(*See article on page* 165)

PENDULUM SUSPENSION FOR RAILWAY VEHICLES

An ingenious method which by placing suspension above the centre of gravity promotes smooth riding



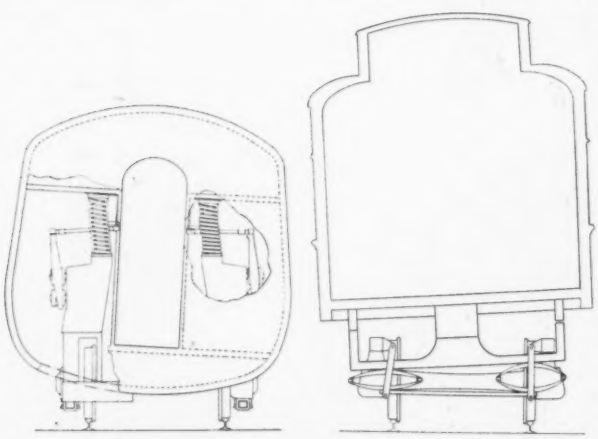
Sectional sketch showing method of suspending coach body on pendulum bogie



All-welded bogie with coil springs for pendulum suspension of coach

A NEW type of bogie pendulum suspension was introduced some time ago experimentally on the Atchison, Topeka & Santa Fe Railway, and was referred to editorially in our issue of March 18 last, page 511. We are now enabled to illustrate one of the bogies and to show by means of a sketch the method of mounting a coach upon it. A diagram is also given to show the effect of the pendulum system in comparison with the orthodox method of suspension when the vehicles are traversing a right-hand curve. It will be observed that instead of leaning outwards, the body of the pendulum car actually cants inwards because the point of suspension is above the centre of gravity. A very smooth riding vehicle is thus provided.

The particular vehicle which is the subject of test is of the articulated type with end bogies having a 9 ft. wheelbase and the articulating bogie a wheelbase of 12 ft. The total weight of each of the former, completely equipped, is only 3½ tons, and of the 12 ft. bogie 4½ tons, these light weights being achieved by completely welded construction and the use of high tensile steel. The springs on which the vehicle is suspended permit, through horizontal deflection, the necessary bogie truck movement relative to the body. A pair of horizontal links elastically restrained by rubber acting between the body and the bogie frame controls this motion.



Sectional diagrams of standard and pendulum coaches showing the action of the bodies when rounding a curve towards the right

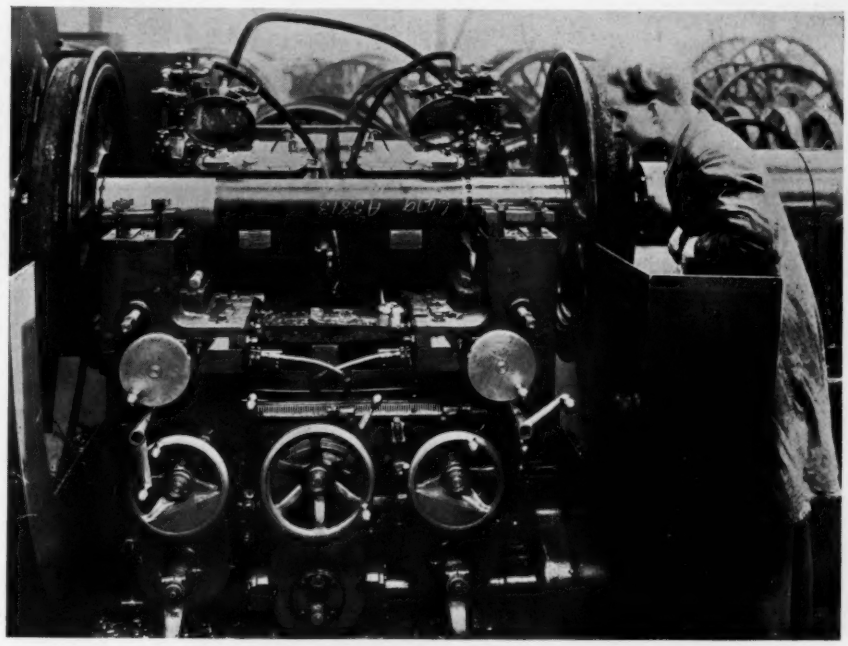
A Columbia River Logging Railway

Although there are logging railways on the Pacific Coast of the U.S.A. that have been in continuous operation for considerably longer than the Columbia & Neralem Railroad, probably none has conveyed a greater quantity of logs during the period of nearly a quarter of a century that it has been in service. We now learn from our American contemporary, *The Timberman*, of the abandonment of this line. The railway is commonly known as the Kerry Road as it was built into the Nehalem Valley from a point on the Columbia River at Kerry (between Clatskanie and Westport, Oregon) by Mr. A. S. Kerry of Seattle. Construction was begun in the early part of 1913; a limited traffic was begun in 1915; and the railway was formally inaugurated on July 28, 1916, when a party of guests took part in an inspection trip to celebrate the completion of a remarkable piece of railway engineering. As at first built the line was about 25 miles long and involved a succession of cuttings and bridges, and the boring of a 1,875-ft. tunnel which, when completed, was stated to be the longest logging railway tunnel on the Pacific Coast. In later years an extension of the line brought the total mileage up to 45. Bridges were numerous, high, and long, and one was ¾ mile long and 164 ft. high. Although primarily a logging railway, it was also a common carrier and published both freight and passenger tariffs. Passenger traffic was handled by petrol railcars. For timber traffic the peak was reached in 1923 when 302,816,375 ft. were delivered, but since 1929 production has dropped considerably and has now resulted in the abandonment of the line.

AXLE GRINDING AT SWINDON LOCOMOTIVE WORKS, GREAT WESTERN RAILWAY

A modern machine tool of high capacity

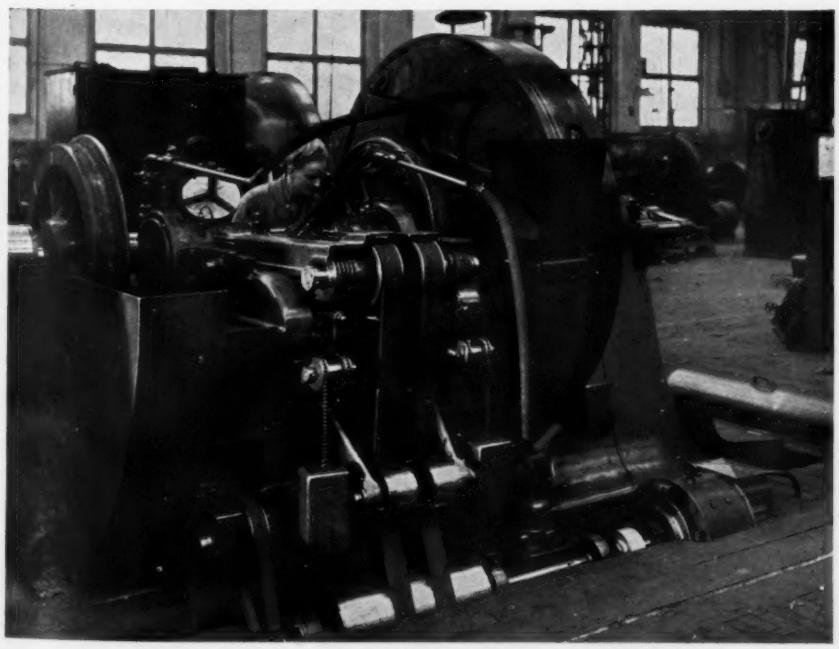
THE axle-grinding machine shown in the accompanying illustrations* is manufactured by the Churchill Machine Tool Co. Ltd., Broadheath, Manchester, and used for grinding axles for locomotive wheel sets at Swindon works, Great Western Railway. The inside journals of the locomotive wheel axles are ground with the wheels mounted in position. The machine has two grinding wheel heads which will operate on two journals simultaneously; or alternatively, the heads can be used independently for grinding one journal at a time. The workhead and tailstock have live spindles, and the wheel set, which is carried on centres, is driven from the face plate, the outside crank being used as a driver. The grinding wheel heads are traversed automatically, and the length of stroke can be regulated to suit the journal.



Front view of machine showing control mechanism

A large balance weight is incorporated in the face plate, which can be adjusted by hand to compensate for the out-of-balance effect of the weights on the wheels. An ammeter is provided, which indicates when the wheel set is in true running balance. Compound slides are used to carry turning tools for facing the inside faces of the wheel hubs, and for forming the radii on the journals. The lower view shows the electric motor, shafts, and belting for transmitting motion to the machine. The belts are of the flat and vee types.

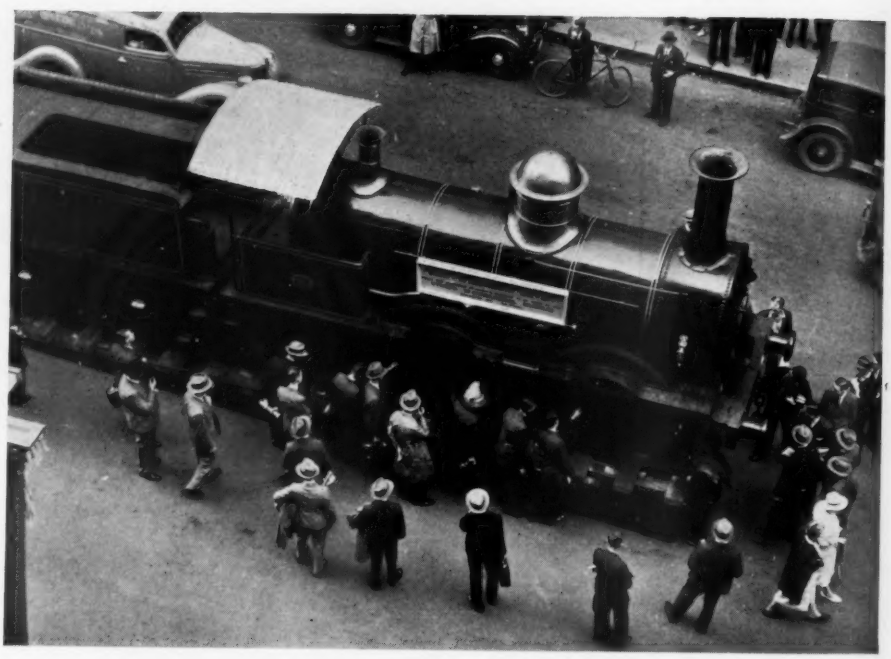
* By courtesy of Mr. C. B. Collett, Chief Mechanical Engineer, Great Western Railway.



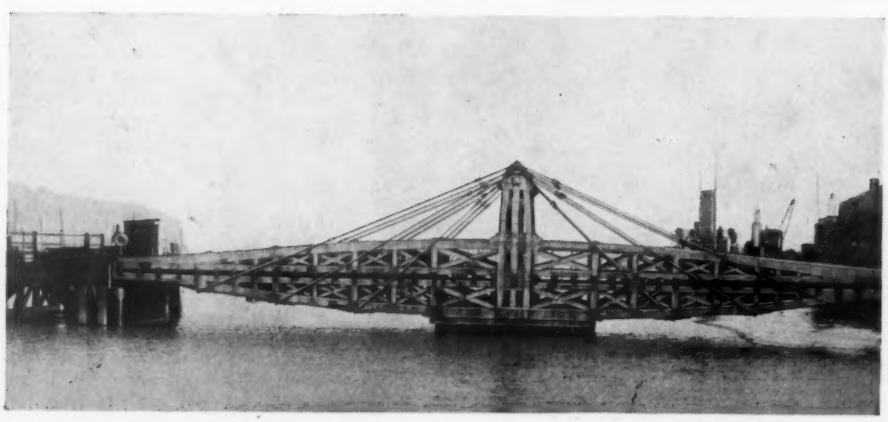
Rear view showing electric motor and driving belts

MOVING AN AIR FORCE SCHOOL.—The L.N.E.R. has been given the task of moving the R.A.F. No. 2 School of Technical Training from Halton Camp, near Wendover, to Cosford. This is one of the biggest removal jobs yet undertaken by any British railway and will involve the use of 122 railway vehicles of various types, from the large 60 ft. carriage truck down to the humble 10-ton wagon. At least three special trains will be required and the removal is to be completed between July 18 and 29. All the camp equipment will be dismantled and loaded on the rail at Wendover station and special squads of men and cartage equipment are being employed to effect the transfer.

Left: Mr. Gilbert S. Szlumper, General Manager of the Southern Railway, at a luncheon at the Savoy Hotel, London, given by the company on July 14 to Mr. H. W. Bevan, the S.R. representative in Australia and New Zealand. Mr. Bevan is on Mr. Szlumper's right
(See report on page 174)



Right: The 0-4-2 locomotive, built by Robert Stephenson in 1854, that worked the first train between Sydney and Parramatta, New South Wales. It is seen on exhibition in the main thoroughfare of Sydney during the N.S.W. 150th anniversary celebrations last January
(See Overseas paragraph on page 153)



Left: Timber swing bridge over the entrance to the inner harbour at Folkestone carrying the harbour branch of the South Eastern Railway. This bridge was built in 1893 to replace the original timber structure of 1843 when the line was opened. The present, which is the third bridge at this point, is a steel structure brought into service in May, 1930

RAILWAY NEWS SECTION

PERSONAL

Mr. J. S. Paterson, Stores Superintendent of the Leopoldina Railway, arrived recently in England on leave.

The term of appointment of Mr. F. P. St. Hill, M.Inst.T., Commissioner for Railways in Tasmania, expires in November next, and it is understood that he does not propose to seek a renewal of appointment.

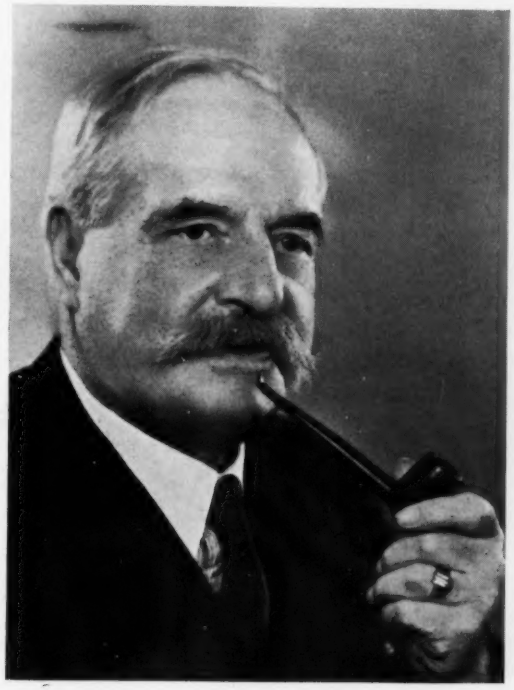
Mr. Leslie Flatt, Chief Mechanical Engineer, North-Western Railway, India, is sailing for India on August 27. After that date letters should be addressed to him at Moghalpura (Lahore).

Mr. Robert Maxwell has been appointed Commercial Manager of British Airways Limited.

Sir Edward Beatty G.B.E., Chairman and President of the Canadian Pacific Railway, arrived at Southampton on July 14, on a visit to this country of about 10 days' duration in connection with the contract for new C.P.R. steamships.

We regret to learn of the recent death of Colonel R. N. Burn, O.B.E., late R.E., retired, who until 1929 was Chief Engineer, Surveys and Construction, North-Western Railway, India, and was subsequently Assistant Director of Transportation at the War Office. Born in July, 1881, Colonel Burn received his commission in the Royal Engineers in 1901, and after serving in the Military Works service, was appointed an Assistant Engineer on the Indian State Railways in July, 1904. He was promoted to be Executive Engineer in 1911, and from 1914 to 1918 was on military duty. On return to civilian railway service, he was appointed officiating Superintending Engineer in November, 1921; and was posted as Divisional Superintendent on the North-Western Railway in October, 1924. In March, 1928, Colonel Burn was promoted to officiate as Chief Engineer, in charge of the very extensive surveys and construction works for extensions to that system. He held the important post of Assistant Director of Transportation at the War Office from November, 1929, to November, 1933, when he finally retired. We share with his wide circle of friends, both in India and at home, a great personal loss, and extend to his family our sincere sympathy.

We regret to announce the death, at the age of 72, of Mr. Samuel Thomas Gresham, which took place quite suddenly on Friday last, July 15, at Bramhall. Mr. Gresham, who was Chairman and Managing Director of the well-known firm of Heatly & Gresham Limited, of London and India, was born in Manchester in 1866. He was educated at Bedford School and served his apprenticeship at the works of Gresham & Craven Limited, of Manchester, the firm established by his father, Mr. James Gresham. In 1888, at the age of 22, he went to India to represent the Vacuum Brake Company in connection with the series of important brake trials on the Quetta section of the North-Western Railway of India, the systems tested being those of the Westinghouse and Vacuum Companies. As a result of these trials, which entailed a large amount of responsibility on one of Mr. Gresham's age, the automatic vacuum brake became standardised on the railways of India. Subsequent to this Mr. Gresham joined the staff of the North-Western Railway to supervise all matters in connection with the braking of locomotives and rolling stock, under the direct order of the Agent. With the rapidly extending use of the vacuum brake on the Indian railways, it was essential that service should be available, and the firm of Heatly & Gresham was founded in Calcutta to give such service throughout India. Subsequently, under Mr. Gresham's guidance, the activities of the firm were greatly enlarged, and the representation undertaken of some of the best-known firms manufacturing railway equipment, including the automatic signalling system of Saxby & Farmer, Pintsch Gas Lighting, The Vulcan Foundry, and others. A further development was the establishment of offices at Bombay, Madras, and Lahore. In later years Mr. Gresham spent most of his time in the London offices of Heatly & Gresham Limited, 40, Wood Street, Westminster, where, in addition to controlling the Indian business of the company, he was able to devote time to his numerous other interests. He was Managing Director of Gresham & Craven Limited, Chairman and Managing Director of Heatly & Gresham Limited, and Vice-Chairman of Gresham, Craven & Heatly (Holdings) Limited, Gresham & Craven (India) Limited, and the Heatly-Gresham Engineering Co. Ltd. He had a very wide circle of railway friends, most of whom made it a regular practice to call upon him when on leave. Mr. Gresham was active up to the last and appeared to be in normal health until just prior to his death. The interment took place last Tuesday, July 19, at the Crematorium, Manchester, when a large and representative gathering of relatives and friends was present.



The late Mr. Samuel Thomas Gresham
Chairman and Managing Director, Heatly & Gresham Limited

Mr. J. R. Morris, who is retiring on July 31—after over 50 years' service with the Great Western Railway—from the position of Divisional Superintendent at Chester, was born in that city in 1872. He was also educated and began his railway career in the Superintendent's Office there, in July, 1888. In 1892 he was transferred to the Private Sidings Section of the General Manager's Office at Paddington, and afterwards to the Commercial and Publicity Department, where he was largely responsible for the publication of the first editions of "Holiday Haunts" and other G.W.R. travel books. In 1901 he received the thanks of the directors and a medal "for the direct and personal responsibility" he took in connection with Queen Victoria's funeral. In that year also he was deputed by the General Manager to revise the staff uniforms, with the result that for some grades serge was

substituted for corduroy, to the great satisfaction of the men. Mr. Morris travelled extensively in connection with his duties, visiting Ireland, France, and America, and returning thence in 1909 in the R.M.S. *Mauretania*, when the Cunard line inaugurated its call at Fishguard. In the following year he went back to Chester as Assistant Divisional Superintendent, and in 1922 assumed control of the division, which has a route-mileage of 350 miles and a personnel of over 1,600. Under him many new works have been carried out in the division, resulting in more efficient and economical working, and including reorganised and accelerated train services. He was seconded from Chester to assist at headquarters in connection with the passing of the railway companies' Road Traffic Acts of 1928. Mr. Morris was always keenly interested in the welfare of the staff, and, in 1899, was largely responsible for the formation of the Great Western (London) Athletic Association. He played football for Middlesex and London County in 1896-7, and has more recently excelled at bowls. Among his other activities were his keen support of the St. John Ambulance movement, for which he was honoured by being made a Serving Brother of the Order last year.

An editorial note upon Mr. Morris and family is published on page 146.

Mr. J. R. Morris
Divisional Superintendent, Chester, G.W.R., 1922–38

We regret to record the sudden death on July 16, at the age of 75, at Cuckfield, Sussex, of Colonel Sir John Wallace Pringle, C.B., R.E. (retired), who was the Chief Inspecting Officer of Railways under the Ministry of Transport from 1916 to 1929. Colonel Pringle, who received his commission as Lieutenant in the Royal Engineers in February, 1883, served in various parts of the Empire and had attained the rank of Major by the time he was appointed an Inspecting Officer under the Board of Trade in 1900. On the outbreak of war he was at once mobilised as Deputy Director of Railway Transport, Home Defence, London District and Eastern Command, with the temporary rank of Colonel. In this rank he was confirmed when, in 1916, he returned to the Board of Trade as Chief Inspecting Officer, succeeding Colonel von Donop. On the formation of the Ministry of Transport in 1919, Colonel Pringle and the Railway Inspection Department were transferred from the Board of Trade and placed under the Public Services and General Purposes Branch of that ministry. He also took Colonel von Donop's place as Chairman of the Railway Employment Safety Appliances Committee, and was appointed Chairman of the Departmental Committee formed in 1920 to revise the Requirements as to New Railways. Also in 1920, he sat as Chairman of the Committee on Automatic Train Control, that made its report in 1922. In the New Year Honours of 1921 Colonel Pringle was made a Companion of the Bath. He represented the British Government at the International Railway Congress in Rome in 1922, and again at the London Congress of 1925. In the latter year, also, he received the honour of knighthood. Sir John was appointed Chairman of the Second Committee on Automatic Train Control formed in January, 1928. He retired from the post of Chief Inspecting Officer of Railways under the age limit on May 23, 1929. Among the serious railway accidents into which he inquired were: Cudworth, January 19, 1905; Elliot Junction, December 28, 1906; Hawes Junction, December 24, 1910; Ais Gill, September 2, 1913; Waterloo Junction, October 25, 1913; Little Salkeld, January 19, 1918; Abermule, January 26, 1901; Euston, April 26, 1924; Haymarket, Edinburgh, July 28, 1924; Lytham, November 3, 1924; Rawmarsh, November 19, 1926; Hull, February 14, 1927; Sevenoaks, August 24, 1927; Darlington, June 27, 1928; and Charfield, October 13, 1928. Sir John was made a Fellow of the Royal Geographical Society in 1891, and in 1895 was awarded the Gill Memorial for his work on the Uganda Railway survey. In 1925 he received the Gold Medal (Engineering) of the Institute of

Elliott [*C. Fry*

The late Colonel Sir John Pringle
Chief Inspecting Officer of Railways, 1916–29

Transport (presented by the Railway Companies' Association) for his paper on "The Ministry of Transport Requirements." Sir John was a Member of the Institution of Civil Engineers and the Institute of Transport; an Honorary Member of the Institution of Locomotive Engineers and the Institution of Railway Signal Engineers; and a Fellow of the Permanent Way Institution. (See also editorial comment on page 145).

The funeral service and cremation took place at Brighton on Wednesday. Among those who attended were:—

Lt.-Colonel A. H. L. Mount (Chief Inspecting Officer of Railways), Colonel A. H. C. Trench (Inspecting Officer of Railways), Mr. J. L. M. Moore (Railway Employment Inspector), Lt.-Colonel G. L. Hall (Assistant Engineer, Signals and Telegraphs, Southern Railway), Mr. C. Tilden Smith (Ministry of Transport), and Mr. G. H. Hare Dean (representing Mr. Gilbert S. Szlumper, General Manager, Southern Railway).

Sir Douglas Fox & Partners, consulting engineers, announces that the title of the firm has been changed to Messrs. Freeman, Fox, and Partners, and that Mr. R. E. Fordham has been taken into partnership.

VICTORIAN RAILWAYS STAFF CHANGES

Consequent upon the concentration of Mr. J. M. Ashworth, Chief Engineer, Way & Works, upon other duties connected with the great survey of metropolitan traffic facilities, Mr. A. G. Fletcher has been appointed Acting Chief Engineer. Until May last Mr. Fletcher was Assistant General Superintendent of Transportation, but he was then appointed substantively to be Assistant Chief Engineer, Way & Works, in place of Mr. C. H. Fethney, retired.

Mr. R. G. Wishart, Commissioners' Special Officer, has been appointed to succeed Mr. Fletcher as Assistant General Superintendent of Transportation.

Mr. J. L. Timewell, Commissioners' Secretary, has been appointed Commissioners' Special Officer, and Mr. C. Davis, Secretary to Mr. Canny, has been appointed Commissioners' Secretary.

By virtue of a decree issued through the Ministry of Public Works, the Argentine Government has appointed Engineer Arturo Noni, Sub-Director-General of Railways, to be Director-General, *vice* Engineer Manuel Garcia Torre, who has resigned from that position on being appointed a member of the newly-formed Transport Co-ordination Corporation, Buenos Aires.

Mr. M. F. Ryan, C.B.E., General Manager, Buenos Ayres & Pacific Railway, and Monsieur Lucien Cocagne, Director-General, Compañia General de Ferrocarriles de la Provincia de Buenos Aires, returned to Buenos Aires from Europe on May 31.

Messrs. J. M. Eddy, C.B.E., Director, B.A. Great Southern, B.A. Western, and B.A. & Pacific Railways, and W. K. Whigham, Director, Central Argentine Railway, who are at present on a business visit to Buenos Aires, were received in audience by the President of the Argentine Republic, Dr. Roberto M. Ortiz, on June 7.

Baron Stamp, Chairman and President of the Executive, L.M.S.R., was introduced into the House of Lords on Wednesday by Lords Plender and Atkin.

From *The London Gazette* of July 19: Regular Army, Supplementary Reserve of Officers, Royal Engineers, Transportation: Colonel the Lord Stamp, G.C.B., G.B.E., D.Sc., Engineer and Railway Staff Corps, T.A., to be Honorary Colonel (May 16).

Mr. H. F. Molony, of the Chief Engineer's Office, Entre Rios Railways, has been transferred to the class of full Member of the Institution of Civil Engineers.

At the meeting of the Court of Assistants of the Worshipful Company of Carmen, on Monday, July 11, election to the office of Senior Warden of the company was declared to be unanimously in favour of W. McAuley Gracie, M.B.E., M.Inst.T. Mr. Gracie is Assistant Goods Manager, Southern Area, L.N.E.R.

INDIAN RAILWAY STAFF CHANGES

Mr. R. Proudlock has been appointed to officiate as Divisional Superintendent, N.W.R., as from May 1.

Mr. R. D. Harrison, Deputy Chief Auditor, Ajmer, B.B. & C.I.R., has been appointed to act as Chief Auditor, Bombay, during the absence on 8 months' leave of Mr. R. W. F. Butterfield, as from May 28.

Mr. R. T. Collins has been appointed to act as Deputy Chief Auditor, Ajmer, and Mr. Jam D. Antia as Deputy Chief Auditor, Bombay, in place of Mr. W. Blake, proceeding on leave.

Mr. J. J. C. Paterson, Locomotive & Carriage Superintendent, B.B. & C.I.R., has been granted leave preparatory to retirement, and Mr. T. Cooper has been appointed to act in his place. Mr. T. D. Macintosh has been appointed to act as Deputy Locomotive & Carriage Superintendent in place of Mr. Cooper.

Mr. V. N. Rowsell, Traffic Superintendent, B.B. & C.I.R., has been granted home leave and Mr. P. S. Clarke is acting for him.

Mr. H. W. Huggins has been confirmed as Deputy Chief Mechanical Engineer, N.W.R.

Mr. W. Sandford Poole has resigned from the Chairmanship of the Interoceanic Railway of Mexico, and the Mexican Eastern Railway, and has been succeeded as Chairman of both companies by Colonel William Parker, who is also appointed a Director of the Mexican Southern Railway. Mr. H. S. Lynch has resigned his seat on the board of the Southern Company and has joined that of the Mexican Eastern Railway. Mr. A. S. Colley has been appointed a Director of the Interoceanic Company.

Mr. P. O. Ferris has been appointed Acting Engineer, Maintenance of Way, Delaware & Hudson Railroad, in succession to the late Mr. H. S. Clarke.

Messrs. W. H. Simmons, F. Hewitt, A. P. Fitzjohn, and Capt. J. C. Cowen have been appointed Directors of Geo. Turton Platts & Co. Ltd.

Craven Brothers (Manchester) Limited announces that Messrs. J. Lauchlan, H. Moliver, and J. H. Rivers have been elected members of that firm's board of directors.

Mr. James Lauchlan was Secretary and Chief Accountant of the Armstrong Construction Co. Ltd., Glasgow, before joining Craven Brothers in 1928 as Chief Accountant, and has been Secretary of the company since March 1929.

Mr. Henry Moliver, A.M.I.Struct.E., Works Manager, joined the firm in 1929. For some seven years previously he was Civil and Works Engineer with the International Combustion Engineering Co. Ltd., Derby. Prior to 1914 he was Assistant Sectional Engineer in the Way and Works Department of the Entre Rios Railways, Argentina, but resigned at the outbreak of the war to serve with H.M. Forces from 1914-1918.

Mr. J. H. Rivers, Chief Designer, has been with the company for 10 years, and formerly held a similar position in the Machine Tool Department of Armstrong, Whitworth & Co. Ltd., Openshaw, which was absorbed by Craven Brothers in 1928. He received his early practical training in the shops of the former L.B.S.C.R. at Brighton, and with L. Gardner & Sons, Patricroft, and his technical training at the Salford Technical Institute.

We regret to record the sudden death in Paris on July 16 of Mr. Samuel Insull, at the age of 78. A native of Westminster, he became Secretary to the London representative of Thomas Alva Edison, and when Edison himself came to London he took Mr. Insull back to the U.S.A. with him as his secretary in 1881. Mr. Insull thus became Edison's representative in his various manufacturing companies, and when these were amalgamated with the General Electric Company in 1892 he was made Second Vice-President of the combined undertaking. He later resigned this post to become President of the Chicago Edison Company, the name of which was changed in 1907 to the Commonwealth Edison Company, and its scope extended until, at the time of its collapse in 1932, it embraced public utilities (including suburban railway systems) covering the whole centre of the United States.

XUM

Luncheon to Southern Railway Australian Agent

(*See illustration on page* 170)

Mr. H. W. Bevan, who in 1935 was appointed Agent in Australia, New Zealand, &c., for the Southern Railway, was on July 14 entertained by the company to a luncheon at the Savoy Hotel to mark his visit to London. Mr. Robert Holland-Martin, Chairman of the Southern Railway, presided, and was supported by :—

Mr. Gilbert S. Szlumper (General Manager), Mr. J. B. Elliot (Assistant General Manager), Mr. E. J. Missenden (Traffic Manager), Mr. R. M. T. Richards (Assistant Traffic Manager), Mr. R. P. Biddle (Docks and Marine Manager), Mr. E. F. Bone (Assistant to Docks and Marine Manager), Mr. E. F. E. Livesey (Development Officer), and Mr. F. H. Marshall (Goods Agent, Nine Elms).

Mr. Holland-Martin, in welcoming the guests, said that at Southampton the company had built up a great Empire port, inasmuch as 60 per cent. of its trade was within the Empire, and they hoped that the percentage in future would be even more ; they were determined that Southampton should give the utmost service to all parts of the Empire, and particularly the Antipodes.

Sir Earle Page, Minister of Commerce, Commonwealth Government, who responded for the guests, said that the satisfactory results accruing from the railway ownership of ports in this country convinced him of the advantages of such a system. He felt that the whole apparatus of transport—roads, railways, ports, and shipping—should be linked together in the strongest possible manner. As great exporters of frozen meat the people of Australia were particularly interested in Southampton because of the 1,700,000 cu. ft. of cold storage accommodation provided there. He regarded the equipment at that port as an asset not only to Britain but to the Empire, and concluded by congratulating the Southern Railway on its service and organisation.

Mr. Gilbert S. Szlumper said that through Southampton in 1936 the company handled £64,000,000 worth of traffic, the fourth largest figure in the United Kingdom after London, Liverpool, and Hull. He paid tribute to the satisfactory results of Mr. Bevan's efforts on behalf of his company.

Mr. Bevan, replying, expressed his gratitude for the great assistance rendered him in his work first by Mr. R. M. T. Richards, the Development Officer at the time of his appointment, and afterwards by Mr. E. F. E. Livesey, who at present holds that appointment.

Among the guests present were :—

The Rt. Hon. Sir Earle Page, G.C.M.G., M.P., Minister of Commerce, Commonwealth Government ; Mr. Clifford Henderson Hay, C.M.G., C.B.E., M.V.O., Acting Agent General for New South Wales ; the Hon. A. L. Bussau, Agent General for Victoria ; Sir Charles McCann, Agent General and Trade Commissioner for South Australia ; the Hon. Sir Hal P. Colebatch, Agent General for Western Australia ; the Hon. Claude E. W. James, Agent General for Tasmania ; Messrs. W. J. Jordan, High Commissioner for New Zealand ; Frank Murphy, Secretary to the Department of Commerce ; A. W. Fisken, Chairman, Australian Meat Board ; A. Rowland, General Manager for New Zealand, Fletcher Meat Company (Vestey) ; F. C. Laurenson, Wilsons Meat ; G. H. Heywood, Executive Officer, Australian Meat Board ; E. J. Webb, Managing Director, Henry S. Fitter & Sons Limited ; Major J. Russell-King, General Manager, Pastoral Distributors Society, Australia ; Messrs. A. G. Gough, Managing Director, Overseas Farmers' Co-operative Federation Limited ; E. A. Eva, General Manager, Australia, Aberdeen & Commonwealth Line ; Geo. Thompson, of Geo. Thompson, Managers, Aberdeen & Commonwealth Line ; Basil Sanderson, Manager, London, Aberdeen & Commonwealth Line ; W. Donald, Manager in London of the Port Line ; F. C. Farake, Commercial Officer, Commonwealth Government ; John MacMillan, General Manager in London, Aberdeen & Commonwealth, and Shaw, Savill Lines ; M. A. Tuohy, London Manager, Australian Dairy Produce Board ; H. E. Davis, New Zealand Dairy Produce Board ; R. S. Forsyth, New Zealand Meat Producers Board ; H. Turner, London Manager, New Zealand Fruit Export Control Board ; A. W. Wilson, General Manager, Gippsland & Northern Co-operative Co. Ltd. ; B. T. Aitken, International Cold Storage and Ice Co. Ltd. ; W. B. Cooper, Australian Canned Fruits Board ; Mr. Fairley, Australian Canned Fruits Board ; Messrs. C. S. Anderson, Director and Secretary, Orient Line ; V. H. Fenney, Freight Manager, P. & O. Line ; C. Goodwin, Goodwin Simons (London) Limited ; W. J. Adams, Secretary, Australian Canned Fruits Board, Melbourne ; Frank Garford, Southern Victoria Pear Packing Company ; J. Scouler, Australian Dried Fruit Board ; Bernard Barr, S. H. Lock & Company ; Mr. Bennett, Weddel & Company ; Mr. J. A. Kay, Editor, THE RAILWAY GAZETTE ; Mr. D. R. Lamb, Editor, *Modern Transport*.

Jubilee of the Maas Light Railway

On May 31 the Maas (Meuse) Light Railway Company, which operates services in Gelderland, North Brabant, and Limburg, on the eastern borders of the Netherlands, celebrated the 25th anniversary of the opening of its Nijmegen-Venlo line. The company was formed in 1911 on the initiative of the Chairman of the then North Brabant German Railway Company, J. M. Voorhoeve, who became its first manager. The route was 63 km. (39 miles) long, and construction work was expeditiously carried out by a contractor named C. P. Stuy. Better means of local communication were much desired in Limburg ; the Government provided a considerable portion of the money required free of interest, and the district authorities concerned also found substantial sums. The equipment of the line, after engineering works were done, was provided for by a loan.

The people in the district welcomed the line, and although experts had thrown doubts on the possibility of earning any appreciable return, results exceeded expectations, earnings being high during the war years. A large proportion of the Government and other grants were repaid, and a modest dividend declared. Until 1919 there was no motor competition to worry the company, but after that circumstances changed rapidly. The competition of motor lorries was particularly badly felt, and although little or nothing was done for a long time by the authorities to modify the unfair conditions under which the company, in common with other similar undertakings in the Netherlands, had to work, the board made every effort to adapt itself to the changing circumstances.

In 1921 the company opened a motor lorry service in Nijmegen, and two years later a bus service between Venlo, Tegelen, and Steyl, with good results. A connection was made to the river at Venlo, and electric crane equipment dealt with large quantities of material taken from vessels for local distribution. A city bus service was started in Venlo in 1927 and when fares were reduced in 1936 a great increase in revenue followed. The company absorbed the Limburg Tramway Company's route between Venlo and Beringen in 1929, making a connection to it at considerable cost and adding 21 km. (13 miles) to its system.

New workshops for upkeep of rolling stock were made at Gennep, out of a building once belonging to the Netherlands Railways, and costs were reduced as much as 50 per cent. An agreement for through goods working was made with the railways. Experiments with diesel traction in 1937 were so successful that it has now entirely superseded the older steam engines. In our *Diesel Railway Traction Supplement* for March 22, 1935, page 576, there was an article descriptive of this phase of the company's development.

In December, 1933, the company took over the Maas and Waal steam tramway ; it took up the 33 km. (20½ miles) line from Nijmegen to Wamel and replaced it by motor services, extending them to Dreumel. Certain bus services in and around Nijmegen were also absorbed and another is shortly to be put in between Venlo and Blerick.

The company has also a tourist bureau in Nijmegen. The country round is both attractive and historically interesting. Many cheap fare facilities exist and have done much to popularise the passenger services, which now cover about 180 km. (112 miles) of route. Although the company has seen many ups and downs in its 25 years the worst difficulties now seem to be behind it. Its relations with State and local authorities continue to be most friendly.

The above brief particulars are taken from an interesting article in *Spoor- en Tramwegen*, by Mr. L. G. Wolf, General Manager from 1919 to 1935, who succeeded Mr. Voorhoeve. The present General Manager is Mr. A. P. Schaffers.

The Royal Visit to Paris

Journeys from London to Dover in Pullman car train, and from Boulogne to Paris behind a Nord streamlined Pacific

The King and Queen left London for their State visit to Paris on Tuesday morning, travelling from Victoria to Dover in a special train composed of six Pullman cars, and hauled by the 4-4-0 "Schools" class locomotive No. 915, *Brighton*. Their Majesties were received in the royal waiting room at Victoria by Mr. Robert Holland-Martin, Chairman of the Southern Railway, who was accompanied by the Deputy-Chairman, Mr. E. Gore-Browne; Lord Rockley, a Director; the General Manager, Mr. Gilbert S. Szlumper; and the Traffic Manager, Mr. E. J. Missenden. Southern Railway officers who accompanied the train to Dover included the General Manager, the Traffic Manager, the Superintendent of Operation (Mr. H. E. O. Wheeler), and the Locomotive Running Superintendent (Mr. A. Cobb). The train was driven by Driver Bullock and Fireman Lindsay, and was in charge of Guard Greenfield.

The royal party crossed the Channel to Boulogne in the Admiralty yacht *Enchantress*, and the normal morning London–Paris services *via* Folkestone–Boulogne were therefore diverted *via* Folkestone–Calais. At Boulogne (Maritime) the party entered the special train in which the journey was made to the Avenue Foch (formerly Bois de Boulogne) station in Paris—near the site of the Porte Dauphine, and the traditional point of arrival for visiting sovereigns. Being situated on the Petite Ceinture, it is connected with all the main lines entering the capital, and from it the majestic Avenue Foch leads direct to the Arc de Triomphe. A special exit staircase was erected at this station, leading to the marquee in which the President received the royal visitors.

The train to Paris was hauled by the former Nord standard super-Pacific No. 3.1280, which was streamlined last year (see our issue of January 22, 1937). It was painted and decorated for the occasion with the colours and coat of arms of King George VI, and had undergone an overhaul at Plaine-Saint-Denis upon which 20 workmen were engaged for 800 hr. Plaques showing the royal coat of arms and the arms of the French Republic were carried on the sides of the coaches, which were painted blue, with gold lines. The driver was M. Cuignet, formerly of the Nord, whose railway experience covers 30 years, and who was awarded the *Croix de Guerre* for bravery in driving trains under shell-fire near the front during the war.

Leaving Boulogne at one o'clock, the train ran to Boran, where it stopped at 3.27 p.m. The King and the Queen, accompanied by the British Ambassador, Sir Eric Phipps, alighted to receive the members of the French mission in attendance on Their Majesties during their stay in Paris. The royal train left Boran at 3.30 and ran to the suburbs of Paris, where the engine was changed, and it was driven over the Petite Ceinture to the Avenue Foch station, reached at 4.50 p.m., by M. Bienvenu.

Five minutes before the train left Boulogne, M. Georges Bonnet, Minister of Foreign Affairs, who had welcomed Their Majesties on landing, started for Paris by railcar, where he arrived at 3.22 p.m. in readiness to welcome the royal party again at the Foreign Office on the Quai d'Orsay.

All the stations through which the royal train passed were closed to the public two hours in advance of the time for its passage. Union Jacks and Tricolour flags decorated the stations and troops were lined up as a guard of honour on the platforms. All bridges and tunnels were guarded by the Mobile Guards, the police, and railwaymen. Passenger and road traffic over all bridges was stopped an hour before the train was due.

The King and Queen are returning to London today (Friday).

New Automatic Telephone and Control System for London Transport

Master control room at Leicester Square—Wired broadcasting equipment for emergencies

A contract has been signed for the supply of £32,000 worth of automatic telephone equipment for the London Passenger Transport Board, the first step toward reorganising the traffic control of the Underground railways. The present telephone system will be converted to full automatic, increasing the number of automatic telephones from 670 to 1,795. The complete scheme will cost £150,000 and take 18 months to instal. Instead of the present decentralised system of traffic control, there will be one master control room at the Leicester Square tube station, where four traffic controllers, with direct communication by automatic telephone to the booking halls and platforms of 300 stations, to every signal cabin, substation, and key point, will be able at need to cut into any conversation on the railway telephones and speak to an official who is needed urgently. In an emergency they will press a key and talk, through loudspeakers, to the ticket office at any important station, their message being relayed to the remaining stations by telephone, on a pre-arranged plan. The telephone facilities on the Metropolitan Line and on the main line railways over which the board will begin to run trains in 1939–40 will be modernised to deal with the intensive services to be introduced. A few minutes will suffice to give a message to every station, from Amersham and Ongar in the north to Wimbledon and Morden in the south. The contractor for the telephone equipment is Ericsson Telephones Limited.

Exports of Railway Material from the United Kingdom in June

	June, 1938	June, 1937	Six Months Ending June, 1938	Six Months Ending June, 1937
	£	£	£	£
Locomotives, rail	154,043	90,051	763,983	557,027
Carriages and wagons	325,393	277,774	1,557,173	1,355,362
Rails, steel	79,433	192,979	708,517	627,209
Wheels, sleepers, fishplates and miscellaneous materials	204,588	174,442	1,085,953	712,541

Locomotive and rail exports included the following:—

	Locomotives		Rails	
	June, 1938	June, 1937	June, 1938	June, 1937
	£	£	£	£
Argentina	15,772	23,843	8,730	5,436
Union of South Africa	—*	—*	13,207	7,339
British India	7,755	14,805	15,992	13,413

* Figures not available

CAPROTTI VALVE GEAR FOR L.N.E.R. LOCOMOTIVES.—The L.N.E.R. is fitting two further six-coupled express passenger engines of Class "B3" with Caprotti valve gear, and of these, the first, No. 6167, is now running so equipped. These engines are of a class introduced on the old Great Central Railway for express passenger train services, and are popularly known as the "Lord Faringdon" class. Two of these engines were fitted with this valve gea eight years ago and they have given excellent service, running an average of 53,000 miles per annum. The decision to equip a further two engines of the same class has been prompted by the satisfactory saving in coal consumption which has been observed in the case of the engines already equipped, particularly since the design of the gear was modified about two years ago.

RAILWAY AND OTHER MEETINGS

Bombay, Baroda & Central India Railway Company

The annual general meeting of the Bombay, Baroda & Central India Railway Company was held at Southern House, Cannon Street, London, E.C.4, on July 20, Major A. D. G. Shelley, R.E., Chairman of the company, presiding.

The Secretary (Mr. N. Lincoln) read the notice convening the meeting and the auditor's report.

The Chairman, in moving the adoption of the report and accounts, said that the total length of the railways under their charge was 3,509 miles. The small decrease of about two miles as compared with the previous year was due to a minor adjustment between running track and sidings. Capital expenditure during the year amounted to a little over 10 lakhs of rupees. This figure would have been greater but for credits on account of, first, the book adjustment against revenue of the original cost of a number of steam locomotives and passenger coaches released as the result of the extension of the electrified system to Virar, and, secondly, the sale proceeds of certain surplus land near Grant Road station, Bombay.

Gross earnings reached the high figure of 11·97 crores of rupees, showing an increase of about 5½ lakhs on 1936-37. This increase was entirely attributable to coaching traffic, and was the more welcome as it had been obtained in the face of the continuing competition of road services. Goods earnings decreased on both gauges, and this was due chiefly to a heavy drop (over 30 per cent.) in the tonnage of raw cotton carried. It must be remembered, however, that in the first few weeks of 1937 the goods earnings were the highest on record, and it was in comparison with that period that the greatest falling off in traffic occurred.

Revenue expenditure increased by some 30 lakhs of rupees, amounting to 656 lakhs, of which 8½ lakhs was due to the book adjustment of the cost of steam locomotives and passenger coaches released as a result of the extension of the electrified system. Net earnings amounted to about 541 lakhs, a reduction of 25 lakhs as compared with the previous year, and the percentage of expenditure to earnings rose by 2·3 to 54·81. The company's profits were more than enough to cover the usual dividend of 6 per cent. As regards prospects for the current year, gross earnings up to date showed a falling off of about 2·7 per cent. as compared with the corresponding period a year ago, due to a decrease in goods traffic; coaching earnings showed a slight improvement. The monsoon had started well, and good rain had fallen in most districts served by the railway. Crop reports were also satisfactory. They might therefore hope that a period of general prosperity was ahead, and that earnings would benefit accordingly.

The Bill empowering the company to make arrangements for running road passenger and goods services and for making agreements with outside road transport concerns received the Royal Assent on March 31; a new contract was being entered into with the Government to enable the company to use these new powers. Meanwhile, the board was contemplating the purchase of two diesel railcar units for use on suitable sections of the broad-gauge system. This proposal was in the nature of an experiment, the results of which would determine future policy in the matter of railcars.

Another experiment, which had been carried out with successful results, was the introduction of air-conditioned passenger coaches on long-distance broad-gauge trains. The Locomotive and Carriage Department produced a very economical design, and the supplement which was charged for accommodation in these coaches covered all charges, including maintenance and depreciation, with a margin for profit. The public appeared to appreciate the comfort afforded by an air-conditioned compartment, which, besides being cool and free from dust, was to a great extent sound-proof.

In conclusion, the Chairman welcomed the company's late Agent, Sir Maurice Brayshay, who was attending the meeting, having left India on retirement last April. Their best thanks were due to him for the very valuable services which he rendered to the company for a number of years. In his place the board had appointed Mr. G. C. Laughton, an experienced railway officer, whose services had been lent to them by the Government.

The report and accounts were unanimously adopted.

QUESTIONS IN PARLIAMENT

Railway Shareholdings in Road Transport

Mr. T. Kennedy—(Kirkcaldy—Lab.), on July 13, asked the Minister of Transport if he had considered what was practically the effective financial control of the leading road transport companies by the railway companies and the growing concern regarding the prejudicial effect of that control on industrial interests and public transport service; and if he proposed to take any action towards the reorganisation of the carrying industries under national control.

Dr. Leslie Burgin: I do not propose to take action on the lines suggested by the right hon. gentleman. I have no reason to suppose that the provision of passenger or goods road transport facilities has been prejudiced because railway companies have financial interests in road transport undertakings.

Cost of Tube Extensions

Mr. B. B. Bull (Middlesex, Enfield—C.), on July 13, asked the Minister of Transport what was the estimated cost of the works proposed to be carried out by the London Passenger Transport Board on the extensions of the railways to the Alexandra Palace, High Barnet, and Bushey Heath, and the value of the contracts already let; and what was the estimated cost of the works proposed to be carried out by the L.N.E.R. on the same line and the value of the contracts already let.

Dr. Leslie Burgin (Minister of Transport): The estimated cost of extensions of tube railways to form junctions with the railways of the L.N.E.R., of electrifying that company's lines to High Barnet, Edgware, and Alexandra Palace, and of doubling the branch line to Edgware is £5,553,000; and the estimated cost of extending the London Passenger Transport Board's railway from Edgware to Aldenham is £1,230,000. The board is to carry out work to the value of £6,033,000, and the balance of £750,000 is to be carried out by the company. The value of the contracts placed for these works is approximately £3,000,000 by the board and £100,000 by the company.

Parliamentary Notes

L.P.T.B. Bill

Opposition to the London Passenger Transport Board Bill in the House of Lords has been withdrawn, and the Bill was committed to the Unopposed Committee of that House, which on July 19, ordered the Bill to be reported, with amendments, for third reading.

Brighton Corporation (Transport) Bill

This Bill was reported, with amendments, on July 19, by the Unopposed Committee of the House of Lords.

SOUTHAMPTON MUNICIPAL AIRPORT, 1938.—The new edition of this illustrated guide to the services and facilities of the Southampton airport, provides all the information required by air travellers or visiting private pilots. There are also brief notes on the activities of the aircraft operators, manufacturers, and repairers, with premises on the airport. Among these is Jersey Airways Limited, which has its English terminus there, and Portsmouth, Southsea & Isle of Wight Aviation. Railway Air Services machines call at Southampton on their journeys between the Midlands and South Wales, and the Isle of Wight and Brighton. Illustrations of Railway Air Services and Jersey Airways machines at Southampton, and of the bus conveying passengers between the airport and Southampton Central station (Southern Railway) are reproduced from THE RAILWAY GAZETTE.

STAFF AND LABOUR MATTERS

Railway Staff National Tribunal

The Railway Staff National Tribunal yesterday began at Montagu House, Whitehall, S.W.1, the hearing of claims submitted by the National Union of Railwaymen and by the railway companies, in regard to the rates of pay and conditions of service of signalmen, relief signalmen, and traffic regulators. Sir Arthur Salter, K.C.B., D.C.L., M.P., is the Chairman of the tribunal and with him are two other independent members, The Rt. Hon. Sir Malcolm Robertson, G.C.M.G., K.B.E., nominated by the railway companies, and Mr. H. J. May, O.B.E., J.P., nominated by the National Union of Railwaymen. The tribunal is assisted by two assessors, Mr. G. L. Darbyshire, Chief Officer for Labour and Establishment, London Midland & Scottish Railway, and Mr. W. T. Griffiths, J.P., President, National Union of Railwaymen, nominated by the railway companies and by the trade union respectively.

The case for the National Union of Railwaymen is being presented before the tribunal by Mr. John Marchbank, General Secretary of the union, and the case for the railway companies by Mr. L. F. Rowlandson, Superintendent of Organisation and Staff, London Midland & Scottish Railway.

The claim of the National Union of Railwaymen includes the following :—

That the wages scale for signalmen be as follows :—

Class	Average number of marks per hour	Standard rate per week First year	At end of second year
		s. d.	s. d.
7	1— 49	50 0	52 0
6	50— 99	52 6	55 0
5	100—149	57 6	60 0
4	150—199	62 6	65 0
3	200—249	67 6	70 0
2	250—299	72 6	75 0
1	300—349	77 6	80 0
Special	350 and over	80 0	and six hours per shift

That the marks for certain operations be varied (these were specified in the claim).

That the following additions be made to the present agreement :—

(1) That where a box has to control points outside what was hitherto regarded as the normal area of control, each signalman in the box shall receive an additional 5s. a week.

(2) That where a lever of any type operates more than one set of points, or one signal, credit will be given on the basis of one mark for each set of points, or each signal operated. The definition of one set of points should be four blades or less.

(3) That where block working is not in operation, six marks to be allowed for through trains, *i.e.*, three for starting trains, three for terminating trains (for diagram reading, &c.).

(4) Where trains for yards or sidings have to be signalled by telephone or bell before being allowed to enter such yard or sidings, they should be regarded for all purposes as through trains.

(5) Where a box is declassified as a result of retaking of marks, the signalmen affected shall be asked if they desire to remain in the post at the lower class, or whether it is their desire and intention to accept a vacancy in a box where their class and rate shall be maintained. If so, they shall retain their rate and class until provided for.

(6) That permanent way motor trollies be dealt with as trains.

Relief signalmen to be in three classes, work the hours of the cabin they relieve, and be paid at the following rates :—

	s.	d.	
Special class	85	0	a week
First class	75	0	,,
Second class	65	0	,,

Certain other provisions in regard to the posts at which relief signalmen should relieve and allowances to be paid to them were included in the claim.

Traffic regulators to be paid at the rate of 85s. a week. Their hours to be governed by the cabin classification.

The claims of the railway companies were :—

(*a*) That the National Agreement, dated May 1, 1922, so far as it applies to signalmen employed in boxes in automatic and semi-automatic areas, should be modified as follows :—

The marks for work (excluding lever movements) performed in signal boxes in automatic and semi-automatic sections to be fixed with the following minima, it being understood that the marks shall only be given for trains in respect of which bell signals or train describers are in operation and that credit for any bell signals or operation of train describers is covered by these marks :—

Through trains	3 marks
Starting trains	1½ ,,
Finishing trains	1½ ,,

In the case of a train passing from an absolute block section to automatic or semi-automatic section credit to be given as a finishing train under the National Agreement so far as the block section is concerned, and credit as a starting train under the above proposal on the automatic or semi-automatic section, and *vice versa* in the case of a train passing from an automatic or semi-automatic to an absolute block section.

Lever movements on an automatic or semi-automatic section to be credited in accordance with the lever movement basis laid down in the National Agreement.

The marks laid down for entries in train register books on automatic and semi-automatic sections to be modified thus :—

For each time entry in respect of through, starting or finishing trains	½ mark

(*b*) That credit to signalmen for operations in connection with the working of permanent way motor trollies should be on the following basis :—

	No. of marks Control box	Non-control box
Where key box is not fixed in signal box		
(*a*) For all operations including telephone messages necessary in connection with releasing occupation key where ganger withdraws key	3	1
Train register entry	1	1
(*b*) For all operations including telephone messages necessary in connection with replacing occupation key where ganger replaces key	3	1
Train register entry	1	1
Where key box is fixed in signal box		
(*c*) For all operations including telephone messages necessary in connection with releasing of and handing to ganger occupation key where signalman withdraws key	6	2
Train register entry	1	1
(*d*) For all operations including telephone messages necessary in connection with replacing occupation key when same is received from ganger and replaced in key box by signalman	6	2
Train register entry	1	1
(*e*) Block signals, lever movements, use of lever collars	Appropriate credit to be allowed in accordance with National Agreement	

As we go to press Mr. Marchbank is presenting the claim of the National Union of Railwaymen.

ROAD ACCIDENTS.—The Ministry of Transport return for June of persons killed or injured in road accidents is as below. The figures in brackets are those for the corresponding period of last year :—

	Killed	Injured
England—		
Pedestrians	163 (148)	4,967 (5,088)
Others ...	290 (295)	13,232 (13,655)
Wales—		
Pedestrians	11 (5)	229 (242)
Others ...	12 (14)	565 (544)
Scotland—		
Pedestrians	24 (30)	703 (641)
Others ...	36 (34)	1,092 (1,246)
	536 (526)	20,788 (21,416)

The total fatalities for the preceding month were 445, compared with 584 in the corresponding period of 1937.

Forthcoming Events

Sept. 15-24.—Model Engineer Exhibition, at Royal Horticultural Hall, Vincent Square, London, S.W.1.

Sept. 19-23.—International Management Congress, at Washington, U.S.A.

International Rail Assembly, at Düsseldorf, Germany.

Sept. 28 (*Wed.*).—Permanent Way Institution (Leeds). "Permanent Way Institution Convention in Germany, 1938," by Mr. W. A. Willox.

Sept. 30 (*Fri.*).—Permanent Way Institution (Hull). "Permanent Way Institution Convention in Germany, 1938," by Mr. W. A. Willox.

MINISTRY OF TRANSPORT ACCIDENT REPORT

Between Waterloo & Charing Cross, Northern Line tube, L.P.T.B., March 10, 1938

At about 8.32 a.m. on March 10, 1938, train No. 4 collided with train No. 65 at low speed. Twelve passengers suffered from minor injuries and shock. About 700 passengers had to walk through the tube to Waterloo or Charing Cross, and their detrainment was completed by about 9.25 a.m. Another train, No. 22, was in Waterloo station, and Nos. 76, 48, 71, 62, and 12 were between that station and Kennington, passengers having to walk to one or other of those stations. Owing to misunderstanding, detrainment of passengers from Nos. 62 and 12 was seriously delayed, considerable discomfort and a few cases of fainting resulting. Another train, No. 52, was held in Kennington station by the signalman Both trains involved in the collision had seven all-steel cars, weighed 170 tons, seated 280 persons, and had Westinghouse electro-pneumatic brake equipment. The brakes were on No. 65 when the collision occurred. Damage to rolling stock was small. Colonel A. C. Trench conducted the inquiry. (The accompanying diagram shows the line and signals concerned, with other details of the circumstances.)

At 7.56 a.m. an intermittent failure developed in signal 94*B* at Waterloo. Stationmaster Finlayson allowed two trains to pass with caution under the emergency arrangement, confirming their arrival at Charing Cross by telephone. A controller's message reached Signal Lineman Renham, in charge of the area (but then at Hyde Park Corner), and Power Signal Lineman Hardy, in charge of Kennington Area, the latter receiving it first. Being at Kennington he proceeded at once and reached Waterloo at 8.11 a.m. Having been only three weeks at Kennington, he had not had time to familiarise himself with equipment outside his area, to which he might be called in emergency, but examined a circuit diagram on his journey. This did not indicate the relative length of the track circuits. Various trains had been allowed to pass the signal with caution. Divisional Inspector Smallbone travelled on one to investigate, in consequence of a motorman's message that signals near Charing Cross were "bobbing." This appears to have been unfounded, no defect being discovered either then or later. The next train being stopped in Waterloo station, Hardy and Finlayson went to the equipment in the tunnel between signals 94*A* and *B*. There was a faulty top contact in track relay 94*A*, so that signal 94*B* was not clearing. More trains were then allowed to pass, and Hardy, satisfied that the relay was picked up, bridged the faulty contact with a loop of wire. He then told Smallbone, who had returned from Charing Cross, to advise the controller that the defect would soon be rectified and told Finlayson that things were practically normal. Smallbone then heard by telephone that signals were again "bobbing," so—the starting signals being clear—advised Driver Keber, train No. 4, to proceed cautiously and advise Charing Cross of anything he saw. The train stopped suddenly before it was out of sight of Waterloo, and Smallbone was surprised to see the starting signals were clear again. He told train No. 22, just running in, not to move. Hardy went again to the relay, removed the wire loop bridging the defective contact and joined a spare good contact in parallel therewith. This put signal 94*B* correctly to red. Hardy did not realise how seriously his original action was shortening the control on this signal, which he had actually cut down to only 100 ft., but did know that it was immaterial for the train then waiting, since the relay was energised.

There was of course no reason why this train and others should not have passed the signal cautiously under the stop and proceed rule, or station to station working, pending the temporary repair Hardy intended to make, but his attention was unfortunately distracted by conversation on the platform and he did not complete the work at once. He allowed several trains to pass, providing what he considered sufficient protection to cover the reduced clearance by showing a red lamp for half a minute after signal 94*B* cleared. Platform delay caused train No. 9 to be stopped at signal 96*A*, No. 65, only just managed to stop clear of it and No. 4, also leaving on the false green signal 94*B*, struck No. 65.

Evidence was given by Driver Green and Guard Storey of train No. 9, and Driver Thomas and Guard Coe of train No. 65, regarding the clear condition of signal 94*B*, the exhibition of the red hand lamp by Hardy, the successful pulling up of No. 65 just clear of No. 9, and certain relevant matters.

Driver Keber, train No. 4, said the starting signals were clear at Waterloo, but the red hand lamp showing. Smallbone told him of signals said to be "bobbing" and that he was to proceed cautiously to Charing Cross; he did not interpret this in the sense of the stop and proceed rule and Smallbone said he did not mean him to. The lineman gave a green hand signal and said it was all right. Just after leaving he saw a tail lamp two car lengths away, but was unable to avoid the collision. Guard Coe, of train No. 65, had heard him coming and swung his oil tail lamp over to the left to give as long a sight round the curve as possible to warn Keber.

Guard Hogan confirmed Keber's evidence; and after the line had been made dead he arranged for the detrainment of the passengers, which was completed by about 9.20 a.m. Detrainment from trains Nos. 76, 48 and 71 was also begun (see diagram).

Delay in Detrainment from Nos. 62 and 12

Traffic Controller Steele, Leicester Square, heard of the collision about 8.30 a.m.; at 8.43 a.m. current was reported off between Lambeth and Charing Cross. At 8.47 a.m. he instructed Signalman Brooks, Kennington, to send no more trains on the Charing Cross line; at 9.0 a.m. Brooks answered him that No. 71 was the last train that passed to that line, but at 10.0 a.m. an inspector advised that there were two more in rear of it. On his enquiring of Kennington, the other signalman said No. 12 had gone also and later he learnt No. 62 was between Nos. 71 and 12. Brooks said he told Control when No. 62 was in his platform and No 12 behind blocking all northbound traffic, also that No. 48 had preceded No. 71, the reverse of the correct order. He did not report No. 71 as the last train in later than this; he thought what he said would have indicated that Nos. 62 and 12 would be bound to follow it. He said he had no direct inquiry about which was the last train into the tunnel. Considerably later the other signalman said No. 12 was the last.

Comparison of reliable times shows that Nos. 62 and 12 must have gone before Brooks had orders at 8.47 a.m. not to send over the Charing Cross line. He therefore held No. 52. Evidence is conflicting, but there seems no doubt Steele made an inquiry of Brooks about 9.0 a.m. regarding the position of trains. Probably a misunderstanding arose later; Brooks claims to have reported No. 52 in the platform, and if either speaker or listener confused 52 with 62, the number referred to a few minutes earlier, the correct inference for Steele would be that No. 71 was the last train in the tunnel. Responsibility for the misunderstanding is attributed mainly to Brooks, but the importance of clear exposition probably did not occur to either man.

Guard Withers of No. 62, after it had been 20 to 30 min. at the rail gap indicator, walked forward to No. 71 and telephoned to the driver about the two loaded trains in rear. He ascertained that the guard of No. 71 had gone forward to report; he returned to his train and, after further delay, went forward again and heard that detrainment of trains ahead was in hand.

Guard Newman of No. 12, whose passengers were suffering considerable discomfort, telephoned to his driver to make inquiries from No. 62, and after further delay decided to go forward himself; it took him about 25 minutes to make his way through his own crowded train; after that he passed through No. 62 and the three trains ahead, reached Waterloo to represent the need of urgent action, and returned

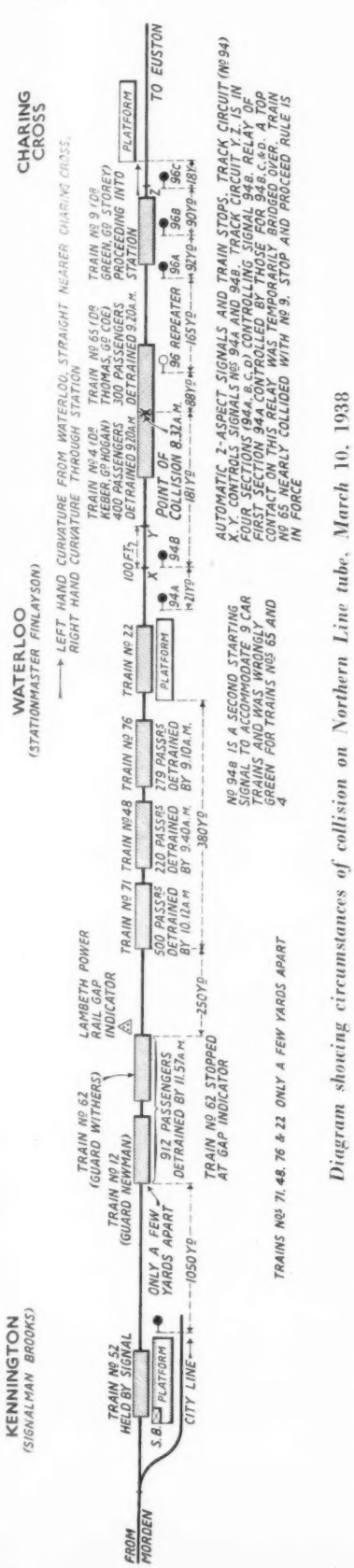

KENNINGTON
(SIGNALMAN BROOKS)
WATERLOO
(STATIONMASTER FINLAYSON)
CHARING CROSS
LEFT HAND CURVATURE FROM WATERLOO, STRAIGHT NEARER CHARING CROSS.
RIGHT HAND CURVATURE THROUGH STATION
TO EUSTON
FROM MORDEN
CITY LINE
PLATFORM
TRAIN Nº 52 HELD BY SIGNAL
TRAIN Nº 62 (GUARD WITHERS)
TRAIN Nº 12 (GUARD NEWMAN)
LAMBETH POWER RAIL GAP INDICATOR
ONLY A FEW YARDS APART
912 PASSENGERS DETRAINED BY 11.57 A.M.
TRAIN Nº 62 STOPPED AT GAP INDICATOR
TRAIN Nº 71
TRAIN Nº 48
TRAIN Nº 76
TRAIN Nº 22
500 PASSRS DETRAINED BY 10.12 A.M.
220 PASSRS DETRAINED BY 9.40 A.M.
279 PASSRS DETRAINED BY 9.10 A.M.
TRAINS Nos 71, 48, 76 & 22 ONLY A FEW YARDS APART
Nº 948 IS A SECOND STARTING SIGNAL TO ACCOMMODATE 9 CAR TRAINS AND WAS WRONGLY GREEN FOR TRAINS Nos 65 AND 4
AUTOMATIC 2-ASPECT SIGNALS AND TRAIN STOPS. TRACK CIRCUIT (Nº 94) X.Y. CONTROLS SIGNALS Nos 94A AND 94B. TRACK CIRCUIT Y.Z. IS IN FOUR SECTIONS (94A, B, C, D) CONTROLLING SIGNAL 94B. RELAY OF FIRST SECTION 94A CONTROLLED BY THOSE FOR 94B, C & D. A TOP CONTACT ON THIS RELAY WAS TEMPORARILY BRIDGED OVER. TRAIN Nº 65 NEARLY COLLIDED WITH Nº 9. STOP AND PROCEED RULE IS IN FORCE
TRAIN Nº 4 (DR KEBER GP HOGAN) 400 PASSENGERS DETRAINED 9.20 A.M.
TRAIN Nº 65 (DR THOMAS, GR COE) 300 PASSENGERS DETRAINED 9.20 A.M.
TRAIN Nº 9 (DR GREEN, GP STOREY) PROCEEDING INTO STATION
POINT OF COLLISION 8.32 A.M.
96 REPEATER
94A
94B
96A
96B
96C
100 FT.
1050 YD.
250 YD.
380 YD.
181 YD.
88 YD.
165 YD.
92 YD.
90 YD.
181 YD.
21 YD.

Diagram showing circumstances of collision on Northern Line tube, March 10, 1938

to his train. Some attempt had been made to alleviate conditions in the more crowded coaches of No. 12 by transferring passengers to the less crowded coaches of No. 62, without much result.

Information about the presence of a train behind No. 71 had, however, been received shortly before 10 a.m., at Waterloo, through Guard Cox, of No. 71, and two inspectors had been despatched immediately to Kennington to arrange detrainment. The first passenger was out by 10.56 a.m., the last by 11.57 a.m.

Inspecting Officer's Conclusions

Responsibility rests primarily with Power Signal Lineman Hardy, who frankly admitted his mistake. He was actuated by the desire to minimise traffic delay; his position was rendered more difficult by his recent transfer to the adjoining area, but his unfamiliarity with local details should have rendered him the more careful in dealing with the emergency. He was overconfident. He is 37, has 15 years service, and a very good record. With a divisional inspector and stationmaster on the spot, it was not within the province of a lineman to control train running.

Members of the traffic staff are not necessarily acquainted with technical details, but one of them should have ascertained the position sufficiently to take charge. Evidence was conflicting regarding the red hand lamp and instructions to drivers. Had the stationmaster obtained more precise information from Hardy and fully appreciated the situation, he would have warned each driver to run to Charing Cross with extreme caution. Because of the curve Driver Keber could not see the oil tail light on train No. 65 beyond 228 ft., nor the electric one beyond 153 ft.; the tunnel lights were on and reduced the range of observation of the tail lamp swung by Guard Coe, who acted with commendable promptitude. Keber cannot be blamed for failure to stop in the distance available. Driver Thomas did well in stopping clear of train No. 9.

Recommendations and Remarks

The board should remind its staff of the necessity for the most rigid observance of the procedure laid down in regulations for dealing with cases of defective signals. Occasional signal failures are inevitable, and every effort is directed to ensure that such failures shall maintain the signal at danger. There are clear and well-established rules for dealing with such cases and keeping traffic moving slowly; and provided they are followed, a signal failure does not involve risk of accident.

Detrainment of passengers from trains Nos. 65, 4, 76, 48 and 71 was carried out efficiently and expeditiously, but the delay was altogether excessive in dealing with Nos. 62 and 12. There was a combination of adverse circumstances, (*a*) the original misunderstanding between the Kennington signalman and the controller, (*b*) the presence of the "gap" about the middle of the section, which for safety reasons cannot be passed like a signal under the stop and proceed rule, (*c*) the fact that this is one of the longest sections on the tubes, and (*d*) ventilation is less satisfactory than elsewhere. Suitable instructions are now being issued as to identifying the position of all trains at the earliest possible moment after any stoppage of traffic. The board is looking into the possibility of altering the location of any of the few gaps not already in or adjacent to stations.

Emergency telephones have already been installed at the stop signals about the middle of this and all other tunnel sections of ¾ of a mile or over between stations; where it is impossible to relocate the gaps, telephones will be provided at the gap indicators also, unless there is a signal with telephone immediately adjacent. Arrangements have also been made to indicate in Kennington signal box occupation of the track circuit in rear of the gap indicator.

The board has been trying for some time to provide additional ventilation in this section of tunnel, but this can be achieved only by works requiring powers, which are being sought in a bill recently submitted to Parliament.

The question was discussed whether the staff of trains Nos. 62 and 12 should not have used the tunnel telephone wires when the delay and discomfort of passengers was becoming serious. The tunnel wires are within reach of the motorman or guard, and after being pinched together, which automatically opens the main traction circuit breaker in the substation, making the rails dead and turning on the tunnel lights, can be used to telephone to the substation staff. The board states that they are provided primarily for cutting off the traction supply in case of fire, or fusing leading to smoke. It is not considered advisable to permit their use for any other purpose which might tend to militate against their absolute reliability in such circumstances. Permitting the staff to use these wires during a prolonged delay merits further consideration and is now being examined; a similar question was raised by Lieut.-Colonel Hall after a collision on the line in 1925.

Some trouble was experienced in detraining passengers from trains Nos. 65 and 4 by floors being buckled up and jamming the end doors of two of the intermediate coaches. It is not practicable nor reasonable to ask that cars should be made collision-proof in this respect, but in its large programme of new rolling stock construction the board has taken immediate steps to modify the end doors to provide some increase of clearance, apart from which the design of the new stock is such that buckling upwards of the floor will be less likely to occur.

NOTES AND NEWS

Earthquake Interrupts Athens Main Line.—An earthquake in Greece on Wednesday, July 20, so damaged a bridge on the main line of the Hellenic State Railways near Athens that neither the Simplon Orient Express nor any other train could leave for Western Europe.

Canada Transport Board.—Before the end of the session the Canadian Parliament passed a measure authorising the substitution of a Transport Board for the present Board of Railway Commissioners, with authority not only over railways but also over water and air transport.

Ashendon Signal Box Burnt Down.—The signal box at Ashendon, the junction of the G.W.R. and the L.N.E.R. main lines respectively between London and Birmingham and London and Leicester *via* High Wycombe, was destroyed by fire on Wednesday and all trains had to be hand signalled until telephone communication was restored.

G.W.R. Holiday Trains Staggered.—This year the G.W.R. has arranged to spread its extra services at the August Bank Holiday period over the three days Friday to Sunday instead of concentrating on Saturday morning, in the hope that those members of the public who can will travel on Friday and Sunday, and so ease the Saturday rush.

Swiss Anniversary Celebrations.—Swiss railway anniversaries occurring this year, beside those already recorded in THE RAILWAY GAZETTE, are the jubilee of the Bürgenstock cable railway, near Lucerne, opened on July 8, 1888, and of the first electric tramway in Switzerland, which was opened on September 16, 1888, between Vevey, Montreux, and Chillon. Also the Gornergrat and the Jungfrau Railways, the two highest lines in Europe, celebrate their 40th anniversary on August 20 and September 20 respectively; the former has issued a commemorative booklet for the occasion.

New Station for Edgware.—The first step in the important reorganisation of railway terminals at Edgware was taken on Wednesday, when the London Passenger Transport Board signed a contract with Allen, Fairhead & Sons Limited for the construction of a £14,000 garage there. When this building is available the existing garage, near the tube station, will be demolished to make way for a larger station. A new Edgware station is necessary to serve the existing tube line, with its extension to Elstree and Bushey Heath, and the tube trains that will run over the electrified L.N.E.R. tracks to the West End *via* Highgate and to the City *via* Finsbury Park. The L.N.E.R. station at Edgware will be closed. It is intended that the design of the new Edgware station will differ from any existing station of the board. It will incorporate a private entrance road, one side reserved for buses and the other side for private cars and taxis. The station and part of this road will be covered by one roof so that passengers may change between road vehicles and trains without being exposed to the weather.

Collision in Germany.—A steam train and a railcar were in collision near Rheinsberg, in the Brandenburg district, last week. Five persons are reported to have been killed and 14 injured.

C.P.R. - C.N.R. Co-operation.—Early action is forecast in Ottawa towards closer co-operation between the two Canadian railways, and a recommendation to this effect was as far as the Senate committee would go last month. As the National Conservative convention has declared against unification, and as the present Government has consistently discouraged it, co-operation would seem the only way left at the moment, though experience is not encouraging for the future.

Lofty Load by Road.—An unusual load was conveyed by the L.N.E.R. on July 16. *George*, the giraffe, arrived at Glasgow by sea, where a quayside crane lifted the crate containing *George* on to a special vehicle which conveyed it from Glasgow docks to High Street for the journey to Corstorphine. From High Street an L.N.E.R. 6-ton Scammell mechanical horse with a special low trailer conveyed *George* direct by road to the Zoological Park at Corstorphine, where he arrived none the worse for the journey.

Institute of Transport Programme, 1938-39.—Mr. Gilbert S. Szlumper will deliver his presidential address at the opening meeting of the forthcoming session of the institute to be held at the Institution of Electrical Engineers, London, on October 10, at 5.30 p.m. Other meetings to take place in London are :—

Ordinary Meetings

1938

Nov. 14—" Cross-channel services from the passenger viewpoint," by A. C. Hardy, B.Sc.

Dec. 12—" Acceleration of railway services," by S. H. Fisher, Member. (Preceded by the annual general meeting.)

1939

Jan. 9—" Passenger transport by road in relation to railway services," by Col. A. S. Redman, C.B., R.E., Member.

Feb. 13—" The interavailability of tickets by rail, road, sea, and air." by J. C. Chambers.

March 13—Particulars to be announced later.

April 3—" The London Passenger Transport Board, 1933-38," by Frank Pick, Past President.

Lectures and Informal Meetings

1938

Oct. 18—" The transport of the grain harvests of the world," by C. Bentham, former Member of Council.

Nov. 29—" The development of air mail," by Group-Captain W. H. Primrose.

Dec. 20—" Some aspects of research in a transport undertaking," by D. Lemon, Member.

1939

Jan. 17—" The railways and the trader," by A. Hastie, Member.

Feb. 21—" The operation and control of a road haulage undertaking," by J. S. Nicholl, a Vice-President.

March 21—" The responsibility of a railway for delay ; should it be made more precise ? " by E. D. Brant, Student.

April 18—" Indian railways : an outline of their history and development," by L. H. Kirkness, C.I.E., D.S.O., O.B.E., Member.

New Amenities at Leeds City Station.—On July 4 new bathrooms, dressing rooms, lavatories, and public conveniences were opened at Leeds City station, which is in course of enlargement and modernisation by the L.M.S.R. in conjunction with the L.N.E.R. The new accommodation is attractively designed on the latest hygienic principles and mechanically ventilated, and marks an important development in railway station planning. It is situated at the extreme north end of the new concourse, from which the approach is by broad, tiled staircases. Access from City Square is by way of the new entrance arcade and rotunda, which were also opened to the public on July 4. The equipment is of the most up-to-date kind and includes drinking fountains and a complete system of electric clocks, as well as efficient lighting.

Bigger Engines for Penrith-Keswick Line, L.M.S.R.—The completion of alterations to bridges and permanent way on the L.M.S.R. line between Penrith and Keswick has made practicable the use of larger locomotives when necessary on trains between those points. Formerly the heaviest engines allowed to work trains over this section have been the ex-L.N.W.R. Class 2 0-6-0 goods (" Cauliflowers "). Engines up to and including the weight of the standard 0-6-0 goods engines of Class 4 may now be used, permitting the working of heavier trains without the assistance formerly called for by the steep climb to Troutbeck (900 ft. above sea level) and the still sharper descent to Keswick. It is expected that when further work at Keswick is completed the line will permit the use of locomotives up to and including the weight of the 4-6-0 " Jubilee " class.

Work on the Replanning of Berlin.—On June 14, work was begun in 16 places in the city, to the accompaniment of appropriate ceremony, on the imposing programme for the replanning of Berlin put in hand by the German Government. At the Königsplatz Dr. Dorpmüller referred to the historical development of water and rail transport in the city and the necessity for constructing improved means of communication. Recently, he said, the Spree and Havel rivers had been joined by the Mittelland canal and would eventually be linked with the Danube. The railway system was to be re-

arranged. New northern and southern main-line stations would be built, while numerous other important works would be carried out all round the city. Seven new railway works have been initiated, namely: (1) the new southern station,* and the Tempelhof sidings for electric suburban trains to replace those at Papestrasse; (2) a new materials testing plant and locomotive repair shops at Lichterfelde; (3) wagon repair shops at Marienfelde; (4) a goods station at Lichterade; (5) a marshalling yard at Grossbeeren to replace others displaced by widening works; (6) a marshalling yard at Wuhlheide to replace older ones at Rummelsburg and Lichtenberg; and (7) an extension of the repair shops for local electric services at Schöneweide.

British Standard Specification for Galvanised Corrugated Steel Sheets.—The British Standards Institution has issued a specification for galvanised corrugated steel sheets (B.S. 798—1938), which was prepared as the result of a request received from the British Steelwork Association. This specification provides for galvanised corrugated steel sheets with a minimum coating of spelter of $1\frac{3}{4}$ oz. per square foot (including both sides) and is issued primarily for use in the home market. Copies may be obtained from the British Standards Institution, 28, Victoria Street. London, S.W.1, price 2s. 2d. post free.

International Exhibition Railway.—Preliminary work has begun in connection with the construction of the new electric line to connect the centre of Rome with the International Exhibition, to be held in 1942. Instead of starting from the Colosseum as at first projected, it will run from the Piazza terminus, and thence underground by way of Via Cavour, Via Annibaldi, Viali dell' Aventino and Porta San Paolo, where it will come to the surface and continue to Magliano. The total length will be 11·5 km. (7·1 miles). It is expected that the trains will be made up of five or six streamlined cars with multiple control.

* This scheme was briefly outlined in a news paragraph on page 283 in our issue of February 11 last.—ED. *R.G.*

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 28th Week			Totals to Date		
	1938	1937	Inc. or Dec.	1938	1937	Inc. or Dec.
	£	£	£	£	£	£
L.M.S.R. (6,834¾ mls.)						
Passenger-train traffic...	718,000	730,000	– 12,000	13,524,000	13,517,000	+ 7,000
Merchandise, &c. ...	426,000	495,000	– 69,000	13,006,000	13,769,000	– 763,000
Coal and coke ...	218,000	219,000	– 1,000	7,169,000	7,337,000	– 168,000
Goods-train traffic ...	644,000	714,000	– 70,000	20,175,000	21,106,000	– 931,000
Total receipts	1,362,000	1,444,000	– 82,000	33,699,000	34,623,000	– 924,000
L.N.E.R. (6,315 mls.)						
Passenger-train traffic...	459,000	468,000	– 9,000	8,743,000	8,856,000	– 113,000
Merchandise, &c. ...	292,000	344,000	– 52,000	9,032,000	9,506,000	– 474,000
Coal and coke ...	194,000	230,000	– 36,000	6,786,000	7,010,000	– 224,000
Goods-train traffic ...	486,000	574,000	– 88,000	15,818,000	16,516,000	– 698,000
Total receipts	945,000	1,042,000	– 97,000	24,561,000	25,372,000	– 811,000
G.W.R. (3,737 mls.)						
Passenger-train traffic...	288,000	288,000	—	5,593,000	5,649,000	– 56,000
Merchandise, &c. ...	178,000	199,000	– 21,000	5,272,000	5,525,000	– 253,000
Coal and coke ...	95,000	111,000	– 16,000	3,084,000	3,166,000	– 82,000
Goods-train traffic ...	273,000	310,000	– 37,000	8,356,000	8,691,000	– 335,000
Total receipts	561,000	598,000	– 37,000	13,949,000	14,340,000	– 391,000
S.R. (2,148 mls.)						
Passenger-train traffic	407,000	405,000	+ 2,000	8,584,000	8,625,000	– 41,000
Merchandise, &c. ...	60,000	66,000	– 6,000	1,687,000	1,738,000	– 51,000
Coal and coke ...	29,000	26,000	+ 3,000	851,000	878,000	– 27,000
Goods-train traffic ...	89,000	92,000	– 3,000	2,538,000	2,616,000	– 78,000
Total receipts	496,000	497,000	– 1,000	11,122,000	11,241,000	– 119,000
Liverpool Overhead ... (6¼ mls.)	1,403	1,482	– 79	37,981	35,568	+ 2,413
Mersey (4½ mls.) ...	4,172	4,018	+ 154	121,147	116,802	+ 4,345
*London Passenger Transport Board ...	566,200	566,500	– 300	1,719,500	1,710,800	+ 8,700
IRELAND						
Belfast & C.D. pass. (80 mls.)	6,745	7,696	– 951	62,588	66,151	– 3,563
,, ,, goods	332	392	– 60	11,895	13,880	– 1,985
,, ,, total	7,077	8,088	– 1,011	74,483	80,031	– 5,548
Great Northern pass. (543 mls.)	18,950	20,600	– 1,650	271,350	273,700	– 2,350
,, ,, goods	9,200	8,500	+ 700	244,500	264,750	– 20,250
,, ,, total	28,150	29,100	– 950	515,850	538,450	– 22,600
Great Southern pass. (2,076 mls.)	46,708	47,343	– 635	914,272	906,567	+ 7,705
,, ,, goods	37,686	36,372	+ 1,314	1,089,408	1,152,000	– 62,592
,, ,, total	84,394	83,715	+ 679	2,003,680	2,058,567	– 54,887

* 3rd Week (before pooling)

British and Irish Railway Stocks and Shares

Stocks	Highest 1937	Lowest 1937	Prices July 20, 1938	Prices Rise, Fall
G.W.R.				
Cons. Ord. ...	67⅜	55¾	43	–2
5% Con. Prefce. ...	127	108	111	–½
5% Red.Pref.(1950)	113	109	109½	—
4% Deb.	113⅝	102½	109½	—
4½% Deb.... ...	118	106	110½	—
4½% Deb.	124½	112	115½	—
5% Deb.	136½	122¾	130½	—
2½% Deb.... ...	76	64	67½	—
5% Rt. Charge ...	133 7/16	118	127½	—
5% Cons. Guar. ...	133¾	116½	127½	—
L.M.S.R.				
Ord.	36⅛	25⅝	14½	–1
4% Prefce. (1923)	82½	65¾	41	–4½
4% Prefce. ...	92½	77¾	63	–2½
5% Red.Pref.(1955)	107¾	102	87½	–6
4% Deb.	108	99¼	103½	–1½
5% Red.Deb.(1952)	117½	111	112½	—
4% Guar. ...	104	95⅞	98	–2
L.N.E.R.				
5% Pref. Ord. ...	12½	6¾	4½	–¼
Def. Ord.	6¼	3⅝	2½	–¼
4% First Prefce.	79½	63	41	–2
4% Second Prefce.	31½	21	13	–½
5% Red.Pref.(1955)	101¼	89¾	62½	–11
4% First Guar. ...	103	91⅞	90	–2
4% Second Guar.	97⅝	85½	80	–2
3% Deb.	84⅛	74	76	–2
4% Deb.	107¼	98½	102	–1½
5% Red.Deb.(1947)	113½	106½	109½	—
4½% Sinking Fund Red. Deb.	110 5/16	105½	107	—
SOUTHERN				
Pref. Ord.... ...	98⅝	83½	67½	–½
Def. Ord.	27⅞	16¾	15½	–½
5% Pref.	126 1/16	105 13/16	108	–1½
5% Red.Pref.(1964)	118	110¼	113½	—
5% Guar. Prefce.	133¾	116¾	126½	—
5% Red.Guar.Pref. (1957)	118½	111½	115	—
4% Deb.	112	101¼	107	–1
5% Deb.	135¾	123½	127½	—
4% Red. Deb. 1962–67	113	105	107	—
BELFAST & C.D.				
Ord.	5	4	4	—
FORTH BRIDGE				
4% Deb.	106	99½	100½	—
4% Guar. ...	105¾	99	99½	—
G. NORTHERN (IRELAND)				
Ord.	11	5	3½	–¼
G. SOUTHERN (IRELAND)				
Ord.	50	21½	20	—
Prefce.	61	34	15	–4
Guar.	94¾	69½	48	—
Deb.	95	82⅛	70½	–1
L.P.T.B.				
4½% "A" ...	123¾	110½	118½	+1
5% "A" ...	135	121½	128½	—
4½% "T.F.A." ...	108¾	104	106	—
5% "B" ...	125	114½	119½	+1
"C"	99¾	75	75½	–½
MERSEY				
Ord.	42⅝	22	18	—
4% Perp. Deb. ...	103	96¾	99*	–2
3% Perp. Deb. ...	77⅝	74½	73½*	–1
3% Perp. Prefce.	68¾	61¼	65	—

* ex dividend

CONTRACTS AND TENDERS

Pitchers Limited has received a contract from the L.N.E.R. in pursuance of the scheme of modernisation at King's Cross station, for the construction of a new parcels and Post Office mail depot on a site adjacent to the main station in Upper Edmund Street. Further reference is made to this improvement scheme on page 150 of this issue.

Coaches for Rhodesia

The Gloucester Railway Carriage & Wagon Co. Ltd. has received an order from the Rhodesia Railways, to the inspection of Messrs. Freeman, Fox & Partners, for the supply of 20 3-ft. 6-in. gauge coaches, comprising ten second-native-guard coaches and ten second-guard coaches.

Allen Fairhead & Sons Limited has received a contract from the London Passenger Transport Board for the construction of a £14,000 garage at Edgware. When the building is available the existing garage, near the tube station, will be demolished to make way for a larger station, to which further reference is made on page 180 of this issue.

Ericsson Telephones Limited has received an order from the London Passenger Transport Board for automatic telephone equipment to the value of £32,000. Further reference to this is made in a news article on page 175.

The General Electric Company and the Westinghouse Electric & Manufacturing Company have both been awarded contracts involving $1,700,000 for building electrical equipment for ten new passenger locomotives for the Pennsylvania Railroad Company, states Reuters.

Jessop & Co. Ltd. has received an order from the Indian Stores Department for a total of 328 steel tyres.

Wm. Jacks & Company has received an order from the Indian Stores Department for 20 crank axles.

Burn & Co. Ltd. has received an order from the Indian Stores Department for 100 steel tyres.

Wota (India) Limited has received orders from the Indian Stores Department for 300 broad-gauge buffer plungers and a quantity of other buffer components including spindles, and washers.

R. Wright & Partners Limited has received an order from the Indian Stores Department for 25 crank axles.

Burn & Co. Ltd. has received an order from the Indian Stores Department for 30,000 ft. of tubular point rodding, 20,000 cast-iron anchor plates for 75-lb. rails, and 348 locomotive tyres.

Suren Piras & Co. has received orders from the Indian Stores Department for a total of 230 broad-gauge locomotive tyres.

Shaw Wallace & Co. has received an order from the Indian Stores Department for 25 crank axles.

Alfred Herbert Limited has received an order from the Madras & Southern Mahratta Railway Administration, to the inspection of Messrs. Rendel, Palmer & Tritton, for the supply of a hardness-testing machine.

I.C. Shunting Locomotives for New Zealand

The Drewry Car Co. Ltd. has received a further repeat order from the New Zealand Government Railways for three internal-combustion shunting locomotives. This order follows those placed respectively about 18 months ago for six, and more recently for two, of these engines which have 75-b.h.p. Parsons petrol engines, the maker's usual arrangement of hydraulic coupling and Wilson-Drewry transmission and are for service on the 3-ft. 6-in. gauge.

Brazilian Railway Orders for United States

Brazil is negotiating with American companies for the purchase of 26 locomotives and 1,000 freight cars, with early consummation of the deal likely, states Reuters from New York. The order, which is the largest American export booking since 1930, will probably be financed with the aid of the Export and Import Bank. The companies involved are the Baldwin Locomotive Works, the American Locomotive Company, Pullman Inc., and the American Car & Foundry Company.

The South African Railways & Harbours Administration is calling for tenders for the supply and delivery for a new engine shed at East London, of quantities of structural steelwork, including columns, bracing, channels, purlins, cross arms, galvanised corrugated roof sheeting, gutters and glass. Tenders endorsed "Tender No. 1772, Engine Shed, East London," should reach the Secretary of the Tender Board, South African Railways, Headquarter Offices, Johannesburg, by August 29. A copy of the schedule of quantities, specifications and general conditions of tender, together with drawings, may be borrowed from the Department of Overseas Trade.

The South African Railways & Harbours Administration is calling for tenders for the supply and delivery of 12 locomotive boilers, standard type No. 2B, with steel fireboxes. Tenders endorsed "Tender No. 1787, Locomotive Boilers," must be received by September 19. A copy of the specifications and general conditions of contract, together with drawings may be borrowed from the Department of Overseas Trade.

The Indian Stores Department is calling for tenders (Tender No. N. 9240) for the supply and delivery of equipment for reclamation and manufacture of locomotive and carriage and wagon alloys, and including oil or electrically-heated de-metalling furnaces, melting and mixing furnaces, sand blast machine, tinning arrangement, and pre-heating muffle furnaces. Tenders should reach the Indian Stores Department, Engineering Branch, Simla, by August 8. A copy of the schedule of requirements, and general conditions of tender, together with drawings, may be borrowed from the Department of Overseas Trade, London, S.W.1.

Steam Crane Required for India

Tenders are invited by the Chief Controller of Stores, Indian Stores Department (Electrical Section), Simla, receivable by August 16, for the supply of one 20-ton self-propelling steam-operated travelling jib crane, complete with dummy truck, 5-ft. 6-in. gauge, required for the E.B. Railway.

Permanent Way Equipment Required for Argentina

The Argentine State Railways Administration is calling for tenders (No. 416/38) for the supply and delivery of the following material:—

54 switches for rails of 37 kg., tangent 0·10, 1-m. gauge (right hand).
63 switches for rails of 37 kg., tangent 0·10, 1-m. gauge (left hand).
117 manganese steel monoblock frogs for rails of 37 kg.
11 switches for rails of 37 kg., tangent 0·08, 1-m. gauge (right hand).
Eight switches for rails of 37 kg., tangent 0·08, 1-m. gauge (left hand).
19 manganese steel monoblock frogs for rails of 37 kg.
12 complete sets of switches for rails of 37 kg., tangent 0·10, 1·435-m. gauge (right hand).
16 complete sets of switches for rails of 37 kg., tangent 0·10, 1·435-m. gauge (left hand).
24 complete sets of switches for rails of 17·36 kg., 0·75-m. gauge, tangent 0·10 (right hand).
24 complete sets of switches for rails of 17·36 kg., 0·75-m. gauge, tangent 0·10 (left hand).
One complete manganese steel crossing with fishplates and bolts for 1-m. gauge rails.
Eight manganese steel monoblock frogs for rails of 31 kg., tangent 0·10, 1-m. gauge with fishplates.

Tenders made out on stamped paper should reach the Departamento de Explotacion Comercial (Almacenes) Ferrocarriles del Estado, Avenida Maipu No. 4, Buenos Aires, by August 18. Local representation is essential. The Department of Overseas Trade is prepared to supply names of United Kingdom firms in a position to present tenders on behalf of tenderers not represented in the Argentine. It is essential that tenders should comply with the conditions, and that the full details called for in the conditions and specifications should be given. Whenever possible, illustrations and drawings of the material offered should be attached. Tenders in English have very little chance of being taken into consideration, and should therefore only be forwarded in cases where the tenderer has an agent capable of translating the tender into Spanish before submission. A copy of the schedule of requirements (in Spanish) only may be borrowed from the Department of Overseas Trade.

Tenders are invited by the Mysore Government Stores Purchase Committee, Bangalore, through Rendel, Palmer & Tritton, 55, Broadway, Westminster, London, S.W.1, receivable by September 19, for the supply of locomotive and carriage spare parts required during the year 1938-39.

OFFICIAL NOTICES

THE Proprietors of the Patent No. 390,953 for "Improvements in or relating to Wheels, especially for Railway and other Similar Vehicles" are desirous of entering into arrangements by way of licence and otherwise, on reasonable terms, for the purpose of exploiting the same and ensuring its full development and practical working in this country. All communications should be addressed in the first instance to: HASELTINE LAKE & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

THE Proprietor of British Patent No. 329,720, dated March 1st, 1929, relating to "Improvements in Railway Rolling Stock Underframe Structures," is desirous of entering into arrangements by way of a licence or otherwise, on reasonable terms, for the purpose of exploiting the above patent and ensuring its practical working in Great Britain.—Inquiries to: B. SINGER, Steger Building, Chicago, Illinois.

OFFICIAL ADVERTISEMENTS intended for insertion on this page should be sent in as early in the week as possible. The latest time for receiving official advertisements for this page for the current week's issue is noon on Thursday. All advertisements should be addressed to:—*The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

RAILWAY AND OTHER REPORTS

Southern Railway Company.—The directors announce that for the half-year ended June 30, 1938, compared with the corresponding period of last (Coronation) year, the receipts from passenger train traffic decreased by £22,000 and the receipts from goods train traffic decreased by £61,000. The railway working expenditure rose by £456,000, of which approximately £220,000 is due to the increased wages granted to the staff in the autumn of last year. The balance may be mainly ascribed to the rise in cost of materials and to heavier maintenance charges. The net receipts from steamboats, docks, harbours and wharves, hotels, interest, etc., show a decrease of £35,000, and the net revenue for the half-year is reduced by approximately £574,000. The directors have decided to pay an interim dividend on the preferred ordinary stock of £1 per cent., which compares with £2 per cent. last year. Interim dividends of £2 10s. per cent. on the guaranteed preference and preference stocks, together with the interim dividend of £1 per cent. on the preferred ordinary stock, will be paid (less income tax) on August 10 next to those proprietors whose names were registered in the books of the company on July 7.

Costa Rica Railway Co. Ltd.—For the year ended June 30 last, this company received £137,100 from the Northern Railway Company in terms of the working agreement, which added to income from investments, &c., makes a total of £153,188. Debenture interest, debenture redemption payments, taxes, administration expenses, &c., take £107,045, leaving a net profit of £46,143. Adding £25,197 brought forward, makes a total of £71,340. The directors recommend a dividend of 2 per cent. on the capital stock, which will absorb £36,000, transfer £5,000 to investment reserve, and £20,000 to reserve fund, leaving £10,340 to be carried forward.

Dorada Railway Co. Ltd.—Gross revenue for the year 1937 amounted to £189,039 and working expenses to £112,844, leaving net receipts of £76,195. Adding £11,912 brought forward, and interest receipts, &c., £14,454, gives a total of £102,561, from which have to be deducted £19,129 for debenture interest and sinking fund, £49,109 for exchange differences, and £130 for pension fund interest. Out of the balance of £34,193 it is proposed to pay a dividend of 4 per cent. for the year (£24,174), leaving £10,019 to be carried forward. Gross receipts of the railway improved by £15,104, of which improvement £2,657 came from passengers and £7,863 from goods. Expenses increased by £13,907, mainly due to higher wages, increased cost of sleepers, and extra mileage run. The whole of the working profit of £9,286 from the ropeway branch was absorbed by loss in exchange, Colombian income tax, and other outgoings, and the net result was a loss of £380.

La Guaira & Caracas Railway Co. Ltd.—Receipts for the year 1937 amounted to £56,057, an increase of £1,380, and working expenses to £47,549, a decrease of £6,489, leaving net receipts of £8,508, to which have to be added transfer fees and bank interest £64, and exchange profit on remittances £5,400. After charging debenture and note interest for the year, and arrears of interest, and making provision for debenture stock redemption, there is a debit balance on the year's working of £13,937, making the total debit balance £79,299. Goods traffic produced £5,500 more than in 1936, but passenger receipts were £4,107 lower, because of the reduction in train service in view of the requirements of the recent labour law, which does not apply to the company's chief competitors, the owner-drivers of motorcars. The saving in expenditure caused by the reduction on passenger service more than compensated for the loss in passenger receipts.

Bolivar Railway Co. Ltd.—This company works at a rental of £9,000 per annum the railway of the Puerto Cabello & Valencia Railway Co. Ltd. Gross receipts of the combined railways amounted in 1937 to £57,516, a decrease of £17,465 in comparison with 1936, but in the working expenses of £57,303 there was a saving of £13,484, leaving a working profit of £213, compared with £4,194 in 1936. Passenger receipts showed a decrease of £1,141, and goods receipts (£50,167) a decrease of £16,739. The construction of a railway from El Palito, connecting the Bolivar Railway with the Puerto Cabello & Valencia Railway, is included in a three-years' plan which the President of Venezuela has proposed and submitted for the approval of Congress. This new line will be of advantage to the two existing systems, and the company's representatives are giving every assistance for the carrying out of the scheme.

North Central Wagon Co. Ltd. A final dividend of 9 per cent. is recommended, making 15 per cent. for the year ended June 30 last.

John Baker and Bessemer Limited.—A dividend is announced on the 6 per cent. cumulative preference shares for the half-year ended June 30, 1938.

Gloucester Railway Carriage & Wagon Co. Ltd.—The dividend for the year ended May 31, 1938, is 3 per cent., less tax, comparing with 2½ per cent. for the previous year.

Snowdon Mountain Railway Limited.—Net profit for the year 1937 was £4,012, compared with £3,854 for the previous year. The amount brought in is £6,450, and it is proposed to maintain the 5 per cent. dividend, requiring £3,500, and leaving £6,962 to be carried forward.

Robert Stephenson & Hawthorns Limited.—Net profits for the year 1937 amounted to £161, compared with a loss of £20,200 in 1936, when a dividend of 2 per cent. was distributed with the aid of £24,000 transferred from general reserve. No dividend is being paid for 1937. The amount of locomotive work available was insufficient for the needs of the industry, but an improved demand for general engineering enabled the company to obtain a larger volume of that class of business. Purchase of the locomotive assets of R. & W. Hawthorn, Leslie & Co. Ltd. has been completed by the company, and the works at Darlington and Newcastle-on-Tyne have been operated under one management since July 1, 1937.

INSTITUTE OF TRANSPORT EXAMINATIONS, 1939.—The institute examinations in 1939 will be held on Thursday, Friday, and Saturday, April 27, 28, and 29, in London and at other centres at home and abroad which will be announced later. Copies of the regulations and syllabuses of the questions set in 1938 and previous years except 1930 and 1935 (price 1s. post free a set), and of the Study Guidance Booklet (price 2s. 6d. post free) may be had from the Secretary or the hon. secretaries of the centres abroad.

Forthcoming Meetings

July 22 (*Fri.*)—**Egyptian Delta Light Railways Limited** (Annual), Winchester House, Old Broad Street, E.C.3, at 12 noon.

XUM

Railway Share Market

At the beginning of the week values in most departments of the Stock Exchange tended to move against holders, but subsequently there was a fairly general improvement in sympathy with the strength of Wall Street markets. Holiday influences are, however, tending to reduce the volume of business, and, in the circumstances, a small amount of buying or selling is inclined to have a marked effect on prices of individual stocks.

Home railway junior stocks were dull and uncertain, awaiting the interim statements, which open this week with those of the Southern and L.N.E.R. The current market view is that at their present levels these stocks more than discount the decline in gross traffics shown to date, but that there is unlikely to be any general improvement in prices until traffic receipts show a better trend.

The decline in receipts for the past week was larger than had been generally expected in the market, except in the case of the Southern, the decrease in this case being only £1,000. If weather conditions are favourable there seems a reasonable possibility of the Southern's passenger traffics expanding sufficiently to enable the weekly receipts to record advances as compared with those of the previous period a year ago. Nevertheless, the railway's deferred and preferred stocks were dull at 15½ and 68, in advance of the half-yearly statement, as were L.N.E.R. first preference at 41 and the second preference at 12½. The 5 per cent. preference and 4 per cent. guaranteed stocks of the latter railway were steadier, and at current prices would appear to give attractive yields in comparison with other securities of a similar class. L.M.S.R. ordinary at 14¾ was better than earlier in the week, as was the 4 per cent. preference at 63 and the 4 per cent. 1923 preference at 41, although the market remains uncertain whether an interim payment will be made on the last-named stock. Great Western ordinary has gone back further to 43 in sympathy with the general trend. As pointed out in these notes on previous occasions, there are considered in many quarters to be reasonable possibilities of a dividend of 3 per cent. on the latter for the current year, the assumption being that the directors would probably decide to draw on reserves if this were necessary in order to prevent the distribution falling below this rate. London Transport "C" has been steady at 75¼.

American railway stocks responded readily to the strength of Wall Street. Union Pacific rose to 83 and Atchison to 40, while Southern Pacific also improved, as did New York Central. Canadian Pacific rose to 7⅛ in sympathy with the general tendency. Argentine railway securities were neglected and the ordinary and preference stocks were mostly lower on balance, but later showed a slight upward trend. Cordoba Central debentures were fairly steady. Elsewhere, San Paulo, Nitrate Rails, and Antofagasta have been reactionary.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1937-38	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1937	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1937	Prices: Lowest 1937	Prices: July 20 1938	Yield % (See Note)
				£	£		£	£	£					
South & Central America	Antofagasta (Chili) & Bolivia	834	17.7.38	13,920	– 1,960	29	450,550	470,400	– 19,850	Ord. Stk.	29	10¼	11	Nil
	Argentine North Eastern	753	16.7.38	12,221	+ 2,128	3	26,148	23,666	+ 2,482	„	18¼	6	6	Nil
	Argentine Transandine	—	—	—	—	—	—	—	—	A. Deb.	93½	60	80	5
	Bolivar	174	June, 1938	3,550	– 2,150	26	22,600	35,000	– 12,400	6 p.c. Deb.	9½	5	8½	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	17	9	5½	9⅛
	Buenos Ayres & Pacific	2,806	16.7.38	73,263	– 10,050	3	165,757	200,869	– 35,112	Ord. Stk.	17⅛	5½	5	Nil
	Buenos Ayres Central	190	26.6.38	$113,000	– $51,800	52	$5,904,000	$7,339,800	– $1,435,800	Mt. Deb.	41½	18	14	Nil
	Buenos Ayres Gt. Southern	5,084	16.7.38	124,380	+ 1,737	3	287,717	282,258	+ 5,459	Ord. Stk.	33¾	13½	13	Nil
	Buenos Ayres Western	1,930	16.7.38	39,144	– 8,313	3	89,329	108,575	– 17,246	„	31¾	11¼	9	Nil
	Central Argentine	3,700	16.7.38	109,386	– 46,169	3	243,632	376,457	– 132,825	„	14¼	10¾	9	Nil
	Do.	—	—	—	—	—	—	—	—	Did.	20½	4½	4½	Nil
	Cent. Uruguay of M. Video	972	9.7.38	18,004	+ 2,955	2	22,281	20,976	+ 1,305	Ord. Stk.	6 7/32	2	2	Nil
	Cordoba Central	1,218	—	—	—	—	—	—	—	Ord. Inc.	6¼	1½	3	Nil
	Costa Rica	188	May, 1938	22,104	– 3,850	48	283,030	218,282	+ 64,748	Stk.	38	27	25½§	7 15/16
	Dorada	70	June, 1938	16,500	+ 2,500	26	95,700	90,400	+ 5,300	1 Mt. Db.	107	106	105	5 11/16
	Entre Rios	810	16.7.38	15,986	+ 1,352	3	35,030	33,108	+ 1,922	Ord. Stk.	19 7/16	6	6	Nil
	Great Western of Brazil	1,092	16.7.38	4,800	– 1,100	29	192,500	212,300	– 19,800	Ord. Sh.	5/8	1/8	1/4	Nil
	International Cl. Amer.	794	May, 1938	$528,092	– $1,314	22	$2,584,877	$2,710,414	– $125,537	—	—	—	—	—
	Interoceanic of Mexico	—	—	—	—	—	—	—	—	1st Pref.	2/-	1/-	1/2	Nil
	La Guaira & Caracas	22½	June, 1938	4,600	– 770	26	30,235	33,705	– 3,470	Stk.	8½	6	8½	Nil
	Leopoldina	1,918	16.7.38	20,752	– 2,621	29	524,110	634,677	– 110,567	Ord. Stk.	9¼	3	2	Nil
	Mexican	483	14.7.38	$308,200	+ $26,200	2	$563,300	$544,600	+ $18,700	„	1½	1/4	5/16	Nil
	Midland of Uruguay	319	June, 1938	7,400	– 2,097	52	111,839	105,718	+ 6,18[illegible]	„	1⅞	1/2	1/2	Nil
	Nitrate	386	15.7.38	4,463	+ 1,555	28	85,296	89,753	– 4,457	Ord. Sh.	3 1/16	2	2	5 *
	Paraguay Central	274	16.7.38	$3,401,000	– $789,000	3	$7,592,000	$9,895,000	– $2,303,000	Pr. Li. Stk.	84	79¼	62½	9 5/8
	Peruvian Corporation	1,059	June, 1938	68,731	– 12,548	52	835,013	870,203	– 35,190	Pref.	14⅝	4½	3¼	Nil
	Salvador	100	9.7.38	¢11,300	– ¢1,150	2	¢14,017	¢17,582	– ¢3,565	Pr. Li. Db.	23½	21½	22½	Nil
	San Paulo	153½	10.7.38	31,713	+ 1,615	28	866,885	900,291	– 33,405	Ord. Stk.	98½	56	41	9¾
	Taltal	160	June, 1938	2,295	– 820	52	39,100	41,035	– 1,935	Ord. Sh.	17/16	11/16	3/4	13 5/16
	United of Havana	1,353	16.7.38	16,369	– 3,251	3	33,902	45,702	– 11,800	Ord. Stk.	5⅝	31/32	2	Nil
	Uruguay Northern	73	June, 1938	909	+ 76	52	11,259	11,689	– 430	Deb. Stk.	10	2	2	Nil
Canada	Canadian National	23,781	14.7.38	637,644	– 116,508	28	17,781,428	20,454,835	– 2,673,407	—	—	—	—	—
	Canadian Northern	—	—	—	—	—	—	—	—	4 p.c.				
	Grand Trunk	—	—	—	—	—	—	—	—	Perp. Dbs.	77	62½	62½	6⅔
	Canadian Pacific	17,186	14.7.38	487,800	– 47,200	28	13,221,800	14,420,400	– 1,198,600	4 p.c. Gar.	101⅞	94½	102½	3⅞
										Ord. Stk.	18	7¼	7⅛	Nil
India†	Assam Bengal	1,329	30.6.38	40,492	+ 2,630	13	340,033	324,979	+ 15,104	Ord. Stk.	86	73½	78	3 15/16
	Barsi Light	202	30.6.38	3,742	+ 1,305	13	34,740	29,925	+ 4,815	Ord. Sh.	66½	46	60	8 5/16
	Bengal & North Western	2,116	30.6.38	74,437	– 6,536	13	787,711	824,590	– 36,879	Ord. Stk.	317	301	291½	6 3/16
	Bengal Dooars & Extension	161	10.7.38	3,153	– 958	14	35,247	34,888	+ 359	„	100	84	85½	7
	Bengal-Nagpur	3,268	30.6.38	195,750	+ 9,579	13	1,843,617	1,853,084	– 9,467	„	101	89	92	4⅜
	Bombay, Baroda & Cl. India	3,085	10.7.38	212,325	+ 4,650	14	2,630,925	2,693,625	– 62,700	„	113	110½	110½	5 7/16
	Madras & Southern Mahratta	2,967	30.6.38	159,150	+ 4,167	13	1,499,646	1,439,747	+ 59,899	„	110	105	107	8 7/16
	Rohilkund & Kumaon	651	30.6.38	14,136	– 1,774	13	158,617	165,513	– 6,896	„	314	302	298½	6
	South Indian	2,531¾	30.6.38	112,118	– 8,130	13	1,074,901	1,067,564	+ 7,337	„	103½	99½	101½	4 11/16
Various	Beira-Umtali	204	May, 1938	84,595	+ 434	35	693,281	585,391	+ 107,890	—	—	—	—	—
	Egyptian Delta	620	20.6.38	5,12	– 552	12	44,265	45,926	– 1,661	Prf. Sh.	31/-	5/4	5/4	Nil
	Kenya & Uganda	1,625	June, 1938	216,938	+ 28,675	26	1,498,289	1,524,339	– 26 050	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb	48⅛	43½	42	8 5/16
	Midland of W. Australia	277	May, 1938	16,569	+ 4,979	48	164,158	144,240	+ 19,918	Inc. Deb.	98	93½	93½	4¼
	Nigerian	1,900	28.5.38	24,280	– 27,926	9	252,701	531,628	– 268,927	—	—	—	—	—
	Rhodesia	2,442	May, 1938	411,404	– 285	35	3,317,856	2,932,177	+ 385,679	—	—	—	—	—
	South Africa	13,263	9.7.38	651,871	– 6,548	15	8,738,874	8,945,267	– 206,393	—	—	—	—	—
	Victoria	4,774	Apr., 1938	871,575	– 13,545	44	8,166,486	8,519,336	– 352,851	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16

† Receipts are calculated @ 1s. 6d. to the rupee § ex dividend.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements are based on the current rates of exchange and not on the par value

Electric Railway Traction

Rectifier Progress

THE large order just placed by the London Passenger Transport Board for pumpless rectifiers to be used in the substations of the North-East London extension seems to lend weight to the prophecy made at a meeting of the Institution of Electrical Engineers eight months ago that air cooled rectifiers would be a standard of the future, and that vacuum pumps would inevitably disappear as a unit feature of each rectifier. Vacuum pumps and other auxiliaries have always been a weak point in the operation of steel tank rectifiers. With improvements in welding, particularly in the atomic-hydrogen process, and a better understanding of the diffusion of gases through metal containers, a perfectly vacuum-tight tank has become feasible. The problem of anode and cathode insulation has been solved by the vitreous enamel seal, and the fitting of a suitable vacuum-tight sealing device has made the steel pumpless rectifier a practical proposition for voltages up to 3,000. It is not impossible that in the future wider use will be made of the American sectionalised rectifier, one of the chief disadvantages of which at the moment is the number of auxiliaries, each section being self-contained in this respect. Although grid control as a means of voltage regulation has not met with a great application, it is not dead as far as traction substations are concerned, although, mainly on the score of simplicity, many railway electrical engineers are against it. On the other hand, grid control is essential with inverted operation. With such operation used for regenerative braking, it still appears to be necessary to have a second rectifier permanently reverse-connected across the d.c. busbars so that the substation can supply or absorb energy in rapid sequence. If it were possible to regenerate only at given times, the second rectifier could be replaced by switches to change over the polarity, and progress towards the installation of only one set of equipment for traction work may be expected. Despite the considerable advance made in rectifier design and construction during recent years, it is not unlikely that we are still on the threshold of rectifier development viewed as a whole.

Battery Traction

THE large amount of electrification carried out in recent years, coupled with the advance in self-propelled vehicles, tends to obscure the quite substantial use made of railcars and locomotives deriving their power from storage batteries. In England, battery propulsion is confined to locomotives, sometimes in conjunction with current-collecting apparatus (*e.g.*, on the L.P.T.B. and at the Castner, Kellner plant), the units in these cases being of the two-power type. In Ireland, Drumm battery trains are still in use on the Great Southern Railways, but their cost of operation is a good deal higher than that of self-propelled cars doing similar work elsewhere in Ireland.

On the Continent, it is in Germany and Italy that the widest use of battery railcars is to be found, and by no means all the cars have that light weight which might be thought essential for satisfactory design and operation. According to statistics published some time ago, there are 212 battery railcars at work in Germany, of which 170 belong to the Reichsbahn. Many of these cars are worked in pairs, coupled back to back, and have carrying capacities, including standing places, of 115 to 140 per pair. Lead type batteries are used and have a range up to 185 miles without recharging, the capacity for this mileage with a 65-ton car being 168 cells of 790 amp.hr. The normal top speed is 37 to 40 m.p.h., but some of the newest cars are allowed to run up to 45 m.p.h. Heating of the cars is carried out by coal or briquette stoves. As a rule the maintenance and repair of the batteries are carried out by the battery makers at a fixed sum per train-mile. An average of 37 days a year out of scheduled service for maintenance requirements compares with an average of 55 days for steam trains working similar services.

In Poland there is a handful of battery cars, most of them ex-German vehicles with characteristics like those of the cars just described. Extensive networks of light railway lines in Lombardy and Piedmont are worked by battery railcars weighing 28 to 34 tons, and hauling trailers up to a total train weight of 70 tons. In Piedmont, up to four trailers are hauled and the carrying capacity of the train is 280 to 300 persons. The normal cars in this area have four 40-h.p. motors and a 160-cell 800-amp.hr. Tudor battery, and run up to 28 or 30 m.p.h. On the average they are off duty because of defects for 19 days a year, contrasting with the not very brilliant average of 86 days of the preceding steam locomotives, which were probably almost worn out. Here, again, battery maintenance is undertaken by the battery makers, the charges a year or two ago being 0·55 lire per train-km. when hauling one trailer, and 0·68 lire when hauling more than one.

Several French local lines are operated by battery railcars, and those on the Cie. des Chemins de fer du Sud-Ouest, a metre-gauge line centred on Toulouse, are of particular technical interest, for they work over grades as steep as 1 in 35 and are fitted with regenerative braking equipment. They have 640 amp.hr. batteries. It has been stated that they have shown a saving of 36 per cent. in operating cost compared with the previous steam trains. On the railways in the Saar, where at one time battery cars were used a good deal, their operating cost was 3·9 fr. per km. against 4·7 fr. with steam. Altogether, about 6,200 miles of railway in Europe have battery railcar services, and of this total about 4,900 miles are in Germany.

Electric Locomotive and Track

MR. E. H. CROFT'S discussion in this week's issue on the electric locomotive as a vehicle would not be necessary if permanent way were consistently up to the highest standard. His statement that " maximum speed is largely fixed by track maintenance costs, which increase rapidly with increase in speed," is no longer true where the permanent way engineer is enabled to bring his track up to the standard required to reduce maintenance costs to almost negligible proportions, regardless of speed and weight of traffic. In THE RAILWAY GAZETTE of July 8 there appeared a brief account of the visit of the Permanent Way Institution to Germany which included a description of modern German track. The members of the Permanent Way Institution on that visit did not fail to observe the extreme steadiness of running on all the trips they made by rail, nor the almost entire absence of any sign of day-to-day maintenance.

XUM

Mercury Vapour Rectifiers in the Supply of Current to Railway Systems

Their effect on neighbouring telephone wires

THE use of mercury-vapour rectifiers in the supply of current to electrified railway systems has been considerably extended during the past few years. This expansion shows every sign of increasing on account of recent improvements in their characteristics in inverted operation, allowing regenerative train-working with considerable economy of current, notably on heavily graded lines.

On single-phase systems, two-anode rectifiers or "mutators" only can be used. On three-phase lines, however, mutators of 3, 6, or 12 phases are suitable; these last, by reason of the high cost of 12-phase feeding

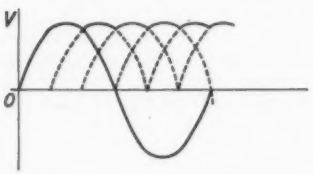


Fig. 1

transformers, are in less frequent use. As a general rule, the six-anode mutator predominates in railway traction on account of its more equalised d.c. current.

Whatever type of rectifier is used, the direct current is derived from the half-waves of alternating current, and hence, as shown by P. Fournier, in *Arts and Metiers*, May,

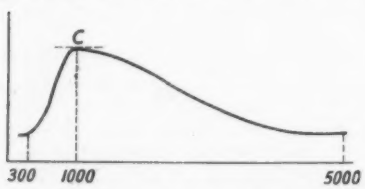


Fig. 2

1937, the curve of available voltage is more or less undulating (Fig. 1) and consists of a periodic wave superimposed on a constant d.c. component. The result on telephone wires placed near the permanent way, and which are not specially installed (buried wires, for instance), is detrimental to proper hearing, interference being caused by the harmonics of the above-mentioned periodic wave, which can be resolved into a fundamental sine wave and harmonics of higher frequency. Certain terms disappear from the Fourier expansion according to the form of the curve, *e.g.* :—

$$e = E \sin wt \pm E_3 \sin 3\,wt \pm E_5 \sin 5\,wt \pm \ldots$$

The membranes are easily vibrated by oscillations of frequency f in the neighbourhood of 1,000 cycles per sec.

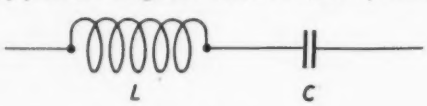


Fig. 3

(*A* sharp, 900; *D* sharp, 1,200; noticeable over the 'phone). The curve of the sensitivity of the human ear to sounds of frequencies ranging from 50 to 5,000 cycles per sec. is substantially as shown in Fig. 2, with a maximum at *C*.

In a circuit, Fig. 3, consisting of a choking coil in series with a condenser, the application of an alternating e.m.f produces a current :—

$$I = \frac{E}{\sqrt{R^2 + \left(Lw - \frac{1}{Cw}\right)^2}}$$

with

$$tg\ \alpha = \frac{Lw - \frac{1}{Cw}}{R}$$

The quantity Lw being the reactance, $\frac{1}{Cw}$ the capacitance, and $\sqrt{R^2 + \left(Lw - \frac{1}{Cw}\right)^2}$ the impedance of the system.

From the above equation it will be seen that I may take very high values, according to the values of the self-induction and capacity concerned. Thus, supposing

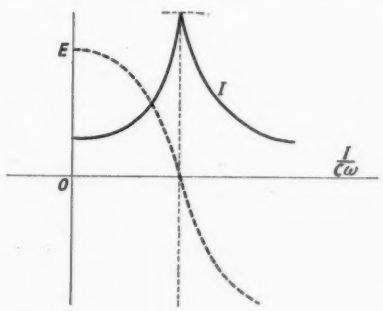


Fig. 4

R and Lw to be constant and Cw variable, we obtain a current curve of the forms shown in Fig. 4, the maximum of I representing the condition of resonance $C = \frac{1}{Lw^2}$.

In this case the circuit behaves as though it contained only ohmic resistance, and all precautions must be taken against over-voltage. Also, the current produced in a circuit of constant resistance R, with inductance L and capacity C, by the nth harmonic of a non-sinusoidal e.m.f. is :—

$$I_n = \frac{En \sin \psi n}{nLw - \frac{1}{nCw}}$$

With $tg\ \psi = \frac{nLw - \frac{1}{nCw}}{R}$; whence $I_n = \frac{En \cos \psi_n}{R}$

This relation shows that if the circuit consists of a simple resistance, the form of the current, as a function of time, is the same as that of the e.m.f.

The reactance of a circuit being greater, the higher the order of the harmonics concerned, it follows that in a circuit containing only inductance the higher harmonics will be more suppressed the higher their frequency, and the current curve will therefore be more nearly sinusoidal than the e.m.f. curve. On the other hand, the capacitance being inversely proportional to the frequency, the higher

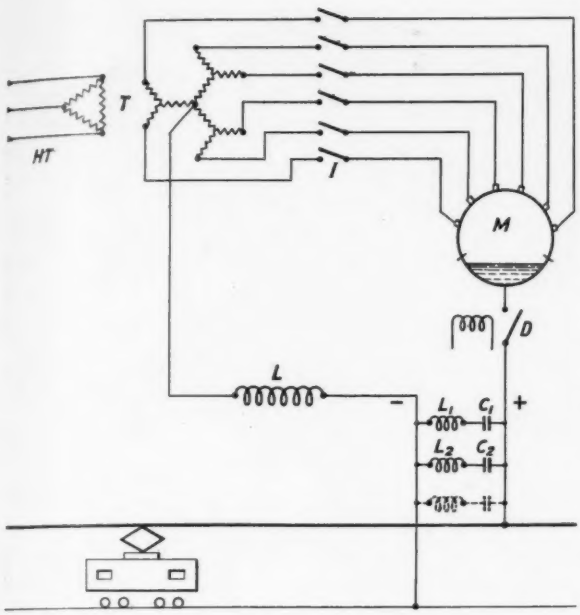


Fig. 5

harmonics of current will be exaggerated by the presence of a series condenser.

In a tuned circuit of inductance L henrys and capacity C farads, resonance is established by an harmonic of the nth order, given by the relation :

$$nLw = \frac{1}{nCw}\text{; whence } n = \frac{1}{w\sqrt{LC}}$$

A circuit of this type, placed across the terminals of a rectifier, constitutes a "resonant shunt," and if the undulating d.c. voltage contains a harmonic of the resonant frequency of the shunt, this harmonic of the current will be by-passed almost completely through the shunt, and the voltage beyond this point will be practically free from the harmonic in question. By using a number of such shunts (Fig. 5) tuned to the fundamental and harmonic frequencies of the undulating component of the d.c. output, the ripples are eliminated by short-circuiting them through the respective channels.

The suppressing power of a resonant shunt acting as a filter is defined by the ratio :

$$pe = \frac{\text{amplitude of a.c. component before filtering}}{\text{amplitude of a.c. component after filtering.}}$$

The higher this ratio, the more effective the filtering, and the lower the voltage induced in the telephone circuits by the harmonics. An auxiliary inductance can be used to allow for variations in resistance of the main circuit in service.

Stainless Steel Stock in Italy

SOMETHING new in electric traction equipment in Italy has been introduced with the latest motor-coaches and trailers on the 3,000-volt d.c. lines of the Bologna-Vignola Railway, for these new vehicles are of stainless steel construction on the Budd system, built by the Italian licensees, S. A. Piaggio, of Genoa. By the adoption of this form, the tare weight of a 300-h.p. two-motor bogie coach has been reduced to 20 tons. Within a body length of 51 ft. there is seating accommodation for 56 passengers. The wheels are of 35½ in. diameter. The bogies are pitched at 33 ft. 6 in. centres and are fabricated of ordinary steel. Westinghouse brakes and pneumatic sanding apparatus are fitted, and pneumatic operation is extended also to the sliding doors of the passenger saloons. Extensive use of aluminium alloys has been made for the interior fittings. The electrical equipment was supplied by the Italian General Electric Company. Special stainless steel driving trailers have been built by Piaggio to work in conjunction with the motor-coaches and normally a train is made up of one motor-coach and one trailer. The top speed in service is 50 m.p.h.

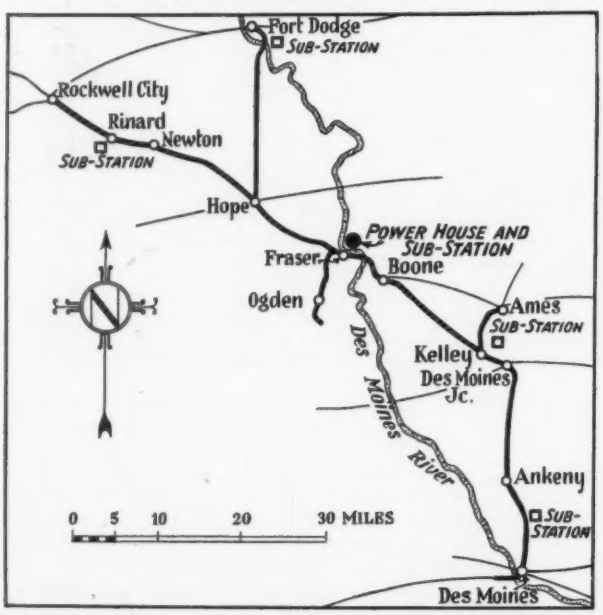
A Middle-West Electrified Line

THE Fort Dodge, Des Moines, and Southern Railroad was formed in 1906 by the amalgamation of steam lines and some small electric lines, together with new extensions. As made up at this time, the line ran from Des Moines to Fort Dodge, Iowa, with a branch to Rockwell City. An additional connection was made to Ames, Iowa, the seat of Iowa State College. Certain of these lines operated by steam and totalling 81 miles in length, were changed over to 600-volt d.c. operation. In 1912 the trolley voltage was increased from 600 to 1,200 volts d.c. in order to handle the increasing freight and passenger traffic more effectively. The route mileage of main line at the present time is given as 150, and with additional tracks, yards, and sidings totals 194 track miles.

In order to handle coal traffic from the mines near Ogden, a branch was constructed from the main line, near Fraser, to the mines. The length of this branch is 4 miles, all electrically operated. The track is standard gauge and grades and curves are comparatively light. The maximum grade on the original steam section is 1·1 per cent. (1 in 91). At two points where special conditions occur, the curves are as sharp as 10 deg. and the grades up to nearly 2·5 per cent. (1 in 40).

Connections are made for interchange traffic with the Chicago, Rock Island & Pacific; the Chicago & North Western, the Illinois Central; Minneapolis & St. Louis; Chicago Great Western; Chicago, Milwaukee, St. Paul & Pacific; Chicago, Burlington & Quincy; and Wabash Railroads. From the beginning the larger part of the company's income has been derived from freight traffic, rather than from passengers. The motive power at the present time includes 8 electric motor-coaches and 13 electric locomotives.

Power is generated in a steam turbine station located at Fraser, which has a total installed capacity of 20,000 kW., with 25-cycle 2,300-volt three-phase generators.



Map of the Fort Dodge, Des Moines, & Southern Railroad

400 h.p. 600/1,200-volt double-bogie locomotive

Power is transmitted over a 22-44 kV. three-phase transmission line to four substations and stepped down to synchronous converter operation, and a fifth substation is located in the power house. In making the changeover to 1,200-volt overhead d.c. distribution, it was deemed expedient to retain 600-volt operation at some points, and the motive power equipment for cars and for most of the locomotives is capable of operation on either 1,200 or 600 volts. The overhead line is a direct suspended trolley of 3/0 copper wire supported from wood poles with bracket construction. At Des Moines catenary construction is used for a short section with a 4/0 copper conductor. Auxiliary feeders are used as shown in the diagram.

All the locomotives are of the Bo-Bo type, except the last 75-ton unit which has an articulated coupling and thus has the Bo+Bo layout. The eight 40-ton locomotives are equipped with four General Electric 600/1,200-volt motors rated at 100 h.p. each, and the four 60-ton units have four 200-h.p. motors. All motors operate two in series on 1,200 volts, and are connected in pairs for series-parallel operation. 600-volt current is obtained for operation of the auxiliaries from a dynamotor. The passenger cars are also equipped with four motors rated at 75 h.p. each. The motor-coaches are each equipped with four General Electric 75 h.p. 600/1,200-volt motors. A commutating switch is used to transfer the control compressor and lighting circuits from the low-voltage tap on the dynamotor to the trolley when changing from 1,200 to 600 volts. The substations and their equipment are as follow:—

	No. of Units	kW	Volts	
East Fort Dodge ..	2	1,250	600/1,200	2 in series.
Rinard	1	300	1,200	
Fraser	2	800	600/1,200	2 in series.
Kelley	2	900	600/1,200	2 in series.
Swanwood Junction ..	2	800	600/1,200	2 in series.

Passenger services consist of two trains each way daily between Fort Dodge and Des Moines. The branch lines to Ames, Rockwell City and to Webster City are operated for freight only. The total freight handled a year amounts to about 42,000,000 ton-miles, and the total passenger service to about 130,000 car-miles.

THE ELECTRIC LOCOMOTIVE AS A VEHICLE

A discussion of some of the fundamentals affecting riding qualities

By E. H. CROFT, A.M.Inst.C.E., A.M.I.E.E.

ONE of the advantages of the electric locomotive is its capacity for providing very large outputs, thus permitting higher speeds for all types of trains. Maximum speed is largely fixed by track maintenance costs, which increase rapidly with increase in speed, and most of the damage to the track is caused by the locomotive, the axle-loading of which is far in excess of that of the coaches. Thus the problem of increased speed becomes one of locomotive design. The required performance must be built into a vehicle which will ride well and stress the track to the minimum.

A locomotive is confined to its path in space, vertically by means of its own weight and the upward thrust of the rails, and horizontally by means of the wheel flanges and super-elevation. The rail surface is of a very smooth nature, but the road bed is irregular, rail joints exist, and horizontal irregularities occur. Thus, as the locomotive travels along it is subjected to sudden movements in a vertical and horizontal plane, which result in: (*a*)

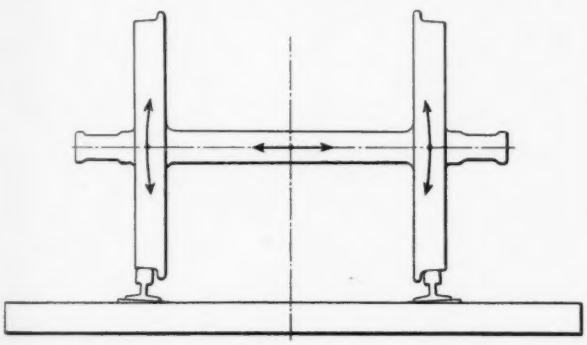


Fig. 1—The wheel pair unit; arrows indicate movement due to track irregularities

high impulse forces vertically and horizontally on the track and locomotive wheels; (*b*) movement of the locomotive body which is unpleasant and may become dangerous.

The problem has received little attention in England, and research is required by practical engineers with scientific minds.

The Wheel Pair Unit

The elementary component of the locomotive is the "wheel pair unit" consisting of two wheels, the axle, and the unsprung portions carried by wheels or axles. (See Fig. 1.) As this unit travels it is subjected to sudden movements both vertically and horizontally, as indicated by the arrows. Upward movements take place on each wheel independently.

To reduce the transient force on the rails caused by these unsprung parts passing irregularities, the mass of the wheel pair unit must be as low as possible and its moment of inertia in a vertical plan transverse to the rails, about the centre of gravity, must be as low as possible. These conditions are met by: (*a*) The adoption of some type of flexible drive to avoid the axle-hung motor: (*b*) the unsprung parts of the drive to be as light as possible, and as close to the locomotive centre line as possible; (*c*) inside axleboxes if possible; (*d*) as small diameter wheels as possible.

It should be mentioned that the ideal way of reducing the rail stresses is by the introduction of rubber between tyre and wheel. While various forms of this exist for light loads, the method is so far not applicable to locomotives. Even should it be possible to develop it in the future for heavy loads it still remains desirable to design all parts for light rail stresses.

Sprung Mass in Transverse Plane

Fig. 2 represents a wheel pair unit supporting the body. First, the effect of a vertical rail irregularity will be considered. If the right-hand wheel be suddenly forced up the movement is resisted by the inertia of the sprung portions. The ideal is the avoidance of high pressures on the rail, and large movements of the body. A " soft " spring will meet these requirements but may allow the body to oscillate too much when once disturbed. A high moment of inertia about the centre of gravity of the body will create high rail pressure but little movement of the body. A high centre of gravity will cause the same effect.

If the thrust due to rail irregularity occurs on both wheels at the same time the force on the rails will depend on the stiffness of the springs and the mass of the body. Since rail stresses are the major consideration, the springs should be as soft as possible, the moment of inertia low, the centre of gravity low, and the mass small. The introduction of these features will have an effect on the

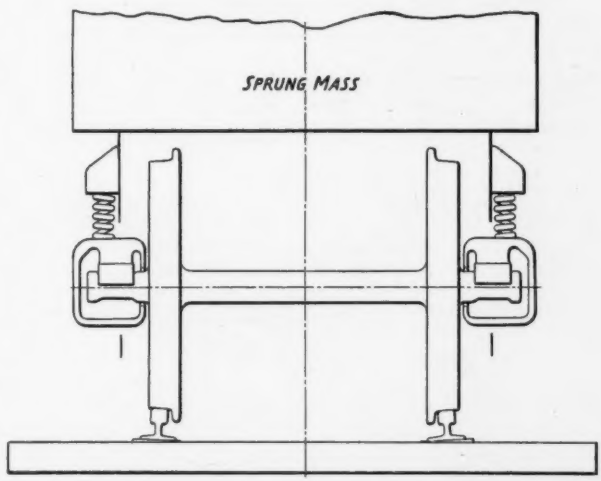


Fig. 2—Sprung mass in transverse plane

swinging or general oscillation of the sprung portions. These are considered later.

Against transverse irregularities no springing is provided. Except for small clearances, a sudden movement sideways of the wheel pair unit must move the sprung mass. If the centre of gravity is on the centre line of the axle the whole mass must move transversely and the transient force

on the rail is high. If the centre of gravity be raised the mass is partly rotated by a transverse irregularity and the transient force on the rails is lower. This tilting action increases the pressure on one spring and reduces it on the other. The lower the moment of inertia of the sprung mass about the centre of gravity and the higher the centre of gravity, the less will be the transverse transient force on the rails, but the greater the vertical transient caused by the transverse movement of the wheel pair unit.

Thus, for both vertical and transverse blows a low moment of inertia of the sprung masses is required, but

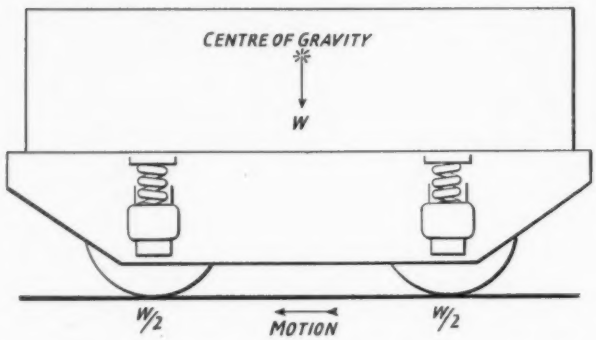


Fig. 3a—Example of vehicle with c. of g. exactly above centre of wheelbase

the vertical blows demand a low centre of gravity while the transverse require a high. Since the transverse irregularities are not cushioned by springs, it is essential in ordinary design to have a high centre of gravity. The greatest step forward in design would be the introduction of horizontal transverse springing between the wheel pair unit and the frame. If this were possible the centre of gravity could be lowered, and a far easier riding locomotive obtained.

Sprung Mass in Longitudinal Vertical Plane

The vertical plane to be considered is a plane through the wheel rims. Since transverse motions have already been considered, this investigation will be simplified by considering the motions taking place in one vertical plane passing through the longitudinal centre line of the locomotive.

For many years steam locomotive designers have considered that the centre of gravity should be situated forward of the centre line of the wheel arrangement This was recently referred to in THE RAILWAY GAZETTE (January 28, 1938). Further, it has been realised that for road vehicles,

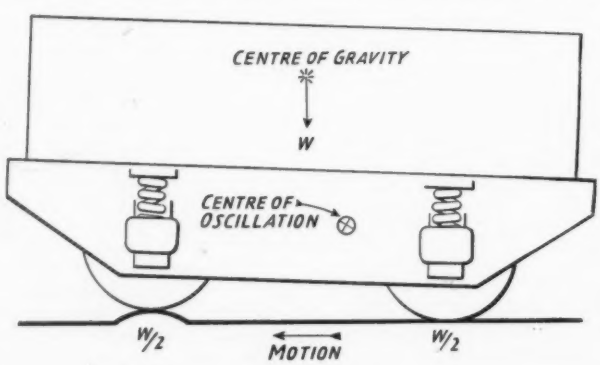


Fig. 3b—Vehicle as indicated in Fig. 3a encountering a track irregularity

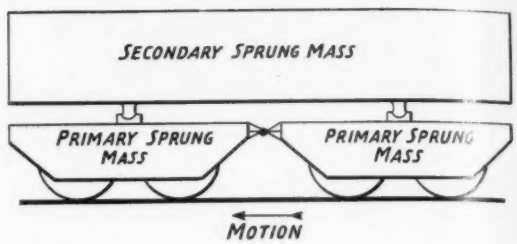


Fig. 4a—Primary and secondary sprung masses

the centre of gravity should be situated well forward. It is considered that for unidirectional vehicles such an arrangement reduces the body movement but increases transient forces on the track. Apart from this it has been suggested that unsymmetrical wheel arrangements have advantages. For duo-directional vehicles the author considers that the only sound basis of design is one in which the centre of gravity lies on the same vertical line as the centre of the wheel arrangement. This is represented in the simplest form by a two-axle truck having each axle equally loaded and provided with similarly graded springs. (See Fig. 3a.)

If the forward wheels pass over an irregularity, they are forced upwards and the reaction met is increased by a high longitudinal moment of inertia, high centre of gravity, short wheelbase, and stiff springs. Thus the moment of inertia should be low, the centre of gravity low, the wheelbase long, and the road spring as soft as possible. (See Fig. 3b.)

Sprung Mass in Longitudinal Horizontal Plane

Considering now the movements in a horizontal plane, caused by transverse rail irregularities, it is readily seen that the wheelbase should be long, and the moment of inertia in the plane referred to low. If transverse springing between the wheel unit and sprung mass could be introduced, transverse irregularities would create far lower transient forces on rails and give less body movement. The benefits of the long wheelbase and the transverse springing are acknowledged by the introduction of guiding trucks, but this is not carried to its logical conclusion by universal transverse springing of all axles. In the above, the effect of the height of centre of gravity has been ignored, since its effect on transverse irregularities has already been considered.

The Secondary Sprung Mass

Many locomotives are not of the rigid frame type but of the double-bogie pattern. Many engineers consider that all high-speed locomotives should be of the rigid frame type, but in the author's opinion this is very doubtful and there is certainly some evidence to contradict it. In a double-bogie locomotive the various views that have already been expressed will of course apply to the bogie frame, which is the primary sprung mass. In certain cases the bogies are connected by articulation. This should remove all drawgear stresses from the body while permitting oscillations of either bogie without affecting the other. If this be not arranged and one bogie affects the other, the effective moment of inertia of each is raised. The secondary sprung portion or cab rests on the bogies at two points, usually in the form of ball seatings; in addition certain steady springs of various forms are used, see Figs. 4a and 4b.

Now to obtain good running, movement of the bogie should be restrained as little as possible by the mass of the body. First by nature of the king pin seating construction the bogie is free to oscillate in a horizontal plane

about the king pin. Similarly it is also free to oscillate in a vertical longitudinal plane. To allow it to move up vertically suitable springing of the seating is essential; to allow it transverse movement side springing of the seating is desirable. These two latter points indicate the use

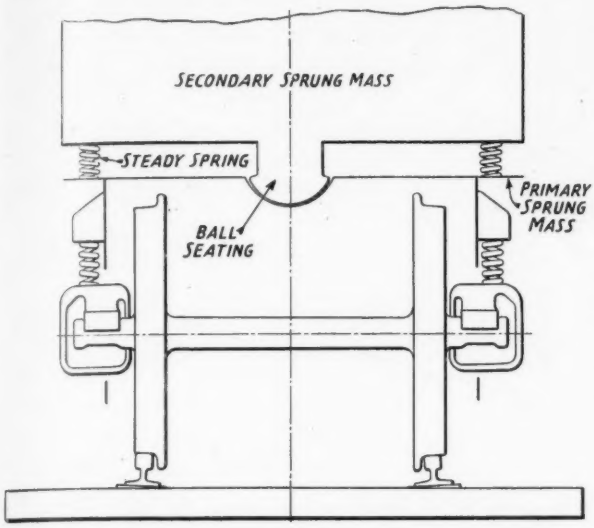


Fig. 4b—Secondary sprung mass in transverse plane

of spring plank and gravity swing links, a similar arrangement to that used almost exclusively on coach bogies but not always on bogie locomotives.

Considering the case where the king pin seating is not sprung transversely, lateral movement of the bogie seating must rotate the body; thus the closer this is to the body centre of gravity the greater will be the reaction to bogie movement. Thus if the king pin centre be unsprung transversely, a low king pin seating and a high centre of gravity are required. However, this gives less stability to the body and requires stronger springs in the side bearers, which in turn limits freedom between bogie and body, particularly to the oscillations in a vertical transverse plane. Although a high centre of gravity is the only possible compromise in many existing designs, far better results would be obtained by providing the springing referred to above, and lowering the centre of gravity and lowering the king pin seating as far as possible.

Swinging of Sprung Masses

To relieve the rails of transient stresses some movement of the sprung masses is essential. These movements and the travelling around curves will cause the sprung masses to oscillate. These oscillations will take place in three planes, namely, transverse vertically, longitudinal horizontally, and longitudinal vertically. In all cases the springing must be stiff enough to limit the oscillations and prevent them building up.

The first requirement would seem to be stiff springs, but as already mentioned springs should be as soft as possible to absorb rail irregularities without disturbing the main sprung masses. A stiff spring for a given disturbance causes greater movement of the body and thus defeats the benefit of limiting body oscillation already set up.

Assuming a given springing, the oscillations in a longitudinal vertical plane will be smaller but of a higher frequency by lowering the centre of gravity and the moment of inertia about the centre of gravity. Similarly, the oscillations in a longitudinal horizontal plane will be reduced, but their frequency increased, by lowering the moment of inertia in this plane. The oscillation in a vertical transverse plane will, as the above, be reduced by lowering the centre of gravity and moment of inertia in the plane.

The reduction of the oscillation in its amplitude means greater safety. The possible increase of frequency may in some cases be a slight disadvantage but the introduction of suitable shock absorbers can easily overcome any slight disadvantage.

Wheel Coning

As wheel coning is a means of centring, it can also set up very bad hunting. Suggestions have been made to eliminate all coning. The author considers this wrong, as it must result in heavier stresses on the wheel flanges. Experiments have been carried out with very low values of coning. The results of these seem doubtful, but in the author's opinion slightly less coning might be of advantage if it does not present complications on rails worn relatively flat to standard coning. But if transverse springing was introduced, the hunting of the wheel pair unit due to coning would not affect the sprung masses to the same degree, and rail and rim stresses would be reduced.

Conclusions

Locomotives are often considered to have good riding properties when they seem to ride comfortably and the body movement is gentle and not excessive. This is an entire fallacy, since such locomotives may be causing very heavy stresses on the track and parts of their structure.

The high centre of gravity is in the main only desirable due to the lack of horizontal transverse springing. A practical form of transverse springing should be considered. The successful introduction of this would permit low centres of gravity and softer springing which are essential to reduce heavy stress transients on the track.

Careful use of dampers or shock absorbers could be used to counteract any disadvantages of softer springing. A locomotive provided with horizontal transverse springing becomes more directly comparable with a road vehicle, in which softer springing and the lowering of the centre of gravity have been combined to yield far better riding and greater stability. Some modern motor-coaches are examples of the bad swinging set up by soft springing combined with high centre of gravity.

B.T.-H. Small Motors.—To the range of B.T.-H. fractional horse-power geared motors another model has just been added, viz., a ½-h.p. 100 r.p.m. three-phase 50-cycle unit. The ratings of the stock machines of this type now cover ⅛, ¼, ⅓, ½, ⅝, and ¾ h.p., all at the four-pole 50-cycle speed of 1,425 r.p.m. The fixing dimensions of these motors ensure that they are interchangeable with all sizes of B.T.-H. sleeve-bearing split-phase and capacitor single-phase motors, and also with d.c. compound-wound motors up to ½ h.p. One important application of these polyphase motors has been found in the ancillary drives on machine tools.

Swedish Private Electrification.—Conversion work on the Bergslagen and Dalsland Railways is now proceeding. According to present schedules the 102-mile line of the former from Gothenburg to Åmål will be transferred to electric working in May, 1939, and the Dalsland line, 40 miles long, from Mellerud to Kornsjö, on the Norwegian frontier, early in October, 1939.

A New Baku.—Plans have been approved for the general reconstruction of the city of Baku, and for the building of a new port to the north-west which will be connected to Baku by an electric railway.

XUM

NOTES AND NEWS

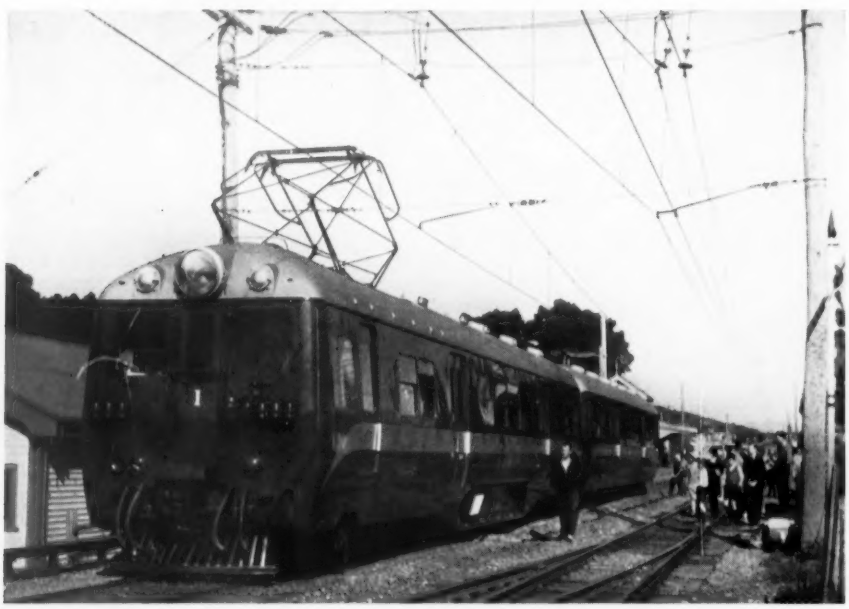
Australian Electrification Report.—Messrs. Rendel, Palmer & Tritton have prepared a report for the New South Wales Government Railways recommending the electrification of the railways from Sydney to Newcastle, Lithgow, Goulburn, and Nowra at an estimated cost of about £9,500,000. The report also considers the establishment of a hydro-electric plant on the Snowy river between Jindabyne and Biddipoint, at a cost of over £10,000,000.

Dick, Kerr Association.—The second annual Dick, Kerr reunion dinner was held in London on June 17, under the presidency of Mr. Douglas Kerr. Among those who made short speeches were Mr. J. E. Calverley and Mr. J. L. Burton, both of the English Electric Co. Ltd. The next dinner is to be held at Preston. Old Dick, Kerr men are invited to get in touch with Mr. R. Briggs, 36, Kingsway, London, W.C.2.

Electrified Bridges Now!—A bridge of death has been discovered in Central Sweden, happily before there had been any victims. By an ingenious scheme the handrails of a railway bridge near the Hallsburg electricity transmission station had been electrified. Anyone touching them would have been killed instantly. A steel wire had been run over the 16,000 volts high-tension cables attached to the protection net below the bridge. A connection had then been made to the iron balustrade of the bridge.—*Nottingham Guardian.*

New Zealand Suburban Electrification.—Trips for the purposes of running-in the stock and training the drivers have been made continuously since the beginning of May over the Wellington-Johnsonville suburban section of the New Zealand Government Railways, and the full normal service will come into operation this month. The illustration on this page shows one of the two-car multiple-unit trains at work. The design of these six trains, which were built by the English Electric Co. Ltd., was described in the issue of this Supplement for January 7 last. The trains have an output of 660 h.p. on the one-hour rating, a tare weight of 58 tons, and a seating capacity of 141. The Johnsonville line is 6 miles long, and the overhead line is fed at 1,500 volts d.c. through one substation with Hewittic glass bulb rectifiers. Two additional passenger stations are being provided, but the journey will be completed in about 20 minutes, that is, 9 minutes less than with steam.

New Zealand Main-Line Electrification.—The electrification on the 1,500-volt d.c. system of the Wellington-Paekakariki section of the North Island main line—over the new Tawa Flats deviation—is now proceeding, and it is the subject of one of the latest English Electric brochures (No. 60 in that company's railway electrification series). This brochure includes a map and description of the line and a complete illustrated description of the eight 2-Do-1 electric locomotives of 1,240 h.p., all of which are to English Electric designs and have that company's electrical equipment. The locomotives are to be used for hauling trains up to 500 tons in weight over 1 in 100 grades.



One of the twin-car multiple-unit trains built by the English Electric Co. Ltd. for the Wellington-Johnsonville suburban line of the New Zealand Government Railways. These trains are capable of an acceleration of 1·5 m.p.h.p.s. on a 1 in 40 grade. They are painted blue with a silver waistband and silver roof. Note the wooden masts for the overhead contact line

North-East London Substations.—The London Passenger Transport Board has placed a contract valued at £296,000 with the General Electric Co. Ltd. for the supply of electrical equipment for twelve substations on the North-East London railway extension scheme. The rectifiers will be 12-phase—four rectifying units coupled into one large unit, each made of steel and requiring neither water-cooling nor vacuum pumps. The substations will be the first in the country to use steel bulb, pumpless, air-cooled rectifiers, with a 12-phase connection. This connection reduces the ripple to an amount equal to that of a rotary converter—to below a 13th harmonic, and it is hoped that the interference factor will be reduced to below those values which are considered to be immune from interference with broadcasting and other communication circuits. Further, it should reduce to a negligible quantity the distortion of the wave form and bring a beneficial effect on the generators. The North-East London railway extension includes the projection of the Central London railway from Liverpool Street to Ongar, and the Fairlop loop line, which are to be opened to electric traction in 1940. By that year the Greenwich generating station, which will feed the new substations, will have had its frequency converted from 25 to 50 cycles (see issue of this Supplement for May 27 last).